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Option Paper

Activity-Based Parks Typology: A Strategy for Addressing the Parks and Recreation Needs of Residents in an Urban Environment

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1. The Challenge

1.1. Research Paper Overview

Park systems across the United States have historically been organized and planned around a typology of parks. Underlying this traditional parks typology is a land intensive approach to providing parks and recreation services. While this approach may be helpful in planning and expanding parks systems in areas where land is inexpensive and readily available, it is not as useful in urban areas where land is at a premium and typically very costly.

This research paper explores the use of an 'activity-based' parks typology to plan for parks and recreation services. Specifically, this research paper answers the questions of what is an activity-based parks typology? What does an activity-based park typology mean for how cities and Parks and Recreation Departments plan and deliver parks and recreation services? What are the spatial requirements of an activity-based parks typology? What are potential planning and design implications of an activity-based parks typology?

1.2. Introduction

Traditional parks typologies have historically been associated with a variety of criteria. These criteria include the size, location, and amenities that are typically appropriate for a particular park type. Many park systems across the Country still relay on these park typologies to expand their system. The author of these park typologies is the National Recreation and Park Association (NRPA), which is the primary professional advocacy organization of the parks and recreation industry. NRPA's Park, Recreation, Open Space, and Greenway Guidelines list sixteen different park types. These range from the smallest park types, a Min- Park and Neighborhood Park, to the largest park types – Large Urban Park or Sports Complex. Following is a description of a few of these park types.

The Neighborhood Park is considered the "basic unit of the parks system and serves as the recreational and social focus of the neighborhood" (National Recreation and Park Association, 1996). This park type is typically between 5 to 10 acres in size, is located within ¼ to ½ mile from residential areas, and typically includes recreation facilities such as a multi-purpose open space, a playground, a pavilion with a restroom, and sports court (National Recreation and Park Association, 1996).

Community Parks serve a larger purpose than neighborhood parks. Their focus is on "meeting community-based recreation needs" (National Recreation and Park Association, 1996). They typically range in size between 30 to 50 acres, are located within ½ mile to 3 miles from residential areas, and typically include a range of active and passive uses. These may include actives uses such as large play structures, sports courts, informal and formal ball fields, and swimming pools. Passive uses may include internal trail networks; individual and group picnic areas and pavilions; general open space and areas that preserve unique landscape features (National Recreation and Park Association, 1996).

Sports Complexes consolidate heavily programmed athletic facilities. They typically range in size between 40 to 80 acres and are located strategically with in the community to maximize access and minimize external effects such as traffic, noise, and light pollution. Facilities typically include ball fields, soccer fields, football fields, sports courts, play structures, and expansive parking lots to allow for crows associated with athletic competitions (National Recreation and Park Association, 1996).

Underlying this park typology is a land intensive approach to providing parks and recreation services. An approach based on grouping varying types and amounts of recreation facilities and spaces within a single space. While this approach may be helpful in planning and expanding parks systems in areas where land is inexpensive and readily available, it is not as useful in urban areas where land is at a premium and typically very costly. This is particular true in urban areas such as New York City, New York; San Francisco, California; Washington, D.C. and even in certain communities in Atlanta, Georgia such as Buckhead.

For example, based on an interview with a District of Columbia Department of Parks and Recreation staff, (West, 2014) the costs of land in Washington D.C. is about $8 million per acre.

Based on an interview with Denise Startling, Executive Director of the non-profit organization Livable Buckhead Inc. in Atlanta, an acre of land in Buckhead can cost anywhere between $600,000 per acre to about $10 million an acre (Starling, 2010). In both interviews, it was clear that purchasing land at these costs for a non-revenue generating purpose was very difficult if not impossible. As the population in these cities continues to grow and densify, it will become even more difficult to acquire the larger parcels of land needed to build park types such as Community Parks and Sports Complexes found in traditional parks typology.

How can then, we address the growing recreational needs and desires of existing and future residents in these urban areas? A closer look at how contemporary populations socialize and recreate may provide an answer.

1.3. A Strategy to Address the Problem – Understanding How People Recreate

An anecdotal analysis of how residents recreate reveals that residents today may not differentiate between the types of parks that they frequent. Instead, they think in terms of *activities*. For example, the Miami –Dade County Parks and Recreation Master Plan completed in 2007 introduced an idea that when looking for opportunities to recreate, residents might speak in terms of activities versus park types. Rather than stating that they would like to visit a specific park type such as a neighborhood park, or a community park, or a sports complex, resident may ask 'where can my family go for a hike today? 'Where can I take my dog to play?' 'Where can my child learn to play baseball?' Or 'where can I take a yoga class?' The focus is on the type of activity, not the types of parks (Glatting Jackson Kercher Anglin, Inc. , 2006).

City Parks and Recreation Department websites also suggest this activity-based approach. The New York City Department of Parks and Recreation website for example, is organized around recreation facilities and programs, not park types. When residents and visitors log onto the Department's website, they are provided with the option to select over 40 types of facilities, over 35 programs, and 12 event types. While they can also search for parks by location and name, there is no discussion of park types (The City of New York, 2015).

Similarly, the City of San Francisco Recreation and Parks Department website provides residents and visitors with a variety of tabs to choose from in their homepage related to parks and recreation actives, not park types. These include types of "Parks and Open Spaces" such as dog play areas, golf courses, and urban agriculture programs; types of "Recreation and Community Services" such as aquatics and pools, recreation programs, and classes; "News and Events" such as calendar of events, press releases, and promotions; and park improvements such as the capital projects and park improvements the department is currently completing. No discussion of park types is provided (City of San Francisco, 2015).

The District of Columbia Department of Parks and Recreation website is also organized around a variety of activities that visitors can participate it, not the types of parks they can visit. When visitors log onto the website, they can choose from a series of tabs including "Activities & Programs" and "Parks & Facilities." Within the "Activities & Programs" tab, visitors have the choice to select 10 different types of activities and programs such as athletic activities, aquatic activities, cooperative play, and therapeutic recreation. Within the "Parks & Facilities" tab, visitors can select 12 different types of facilities including community gardens, environmental centers, fitness centers, gymnasium, and playgrounds (The District of Columbia, 2015). Similar to the New York City Department of Parks and Recreation website and the City of San Francisco Recreation and Parks Department website, there is no mention of park types in the District of Columbia Department of Parks and Recreation website. Findings from the selected city parks department websites and the Miami –Dade County Parks and Recreation Master Plan may suggests a shift in how we deliver parks and recreation services. A shift that considers a new *'activity-based'* parks typology.

What is an activity-based parks typology? What does an activity-based park typology mean for how cities and Parks and Recreation Departments plan and deliver parks and recreation services? What are the spatial requirements of an activity-based parks typology? What are potential planning and design implications of an activity-based parks typology? The following section explores these concepts further and describes the proposed outcomes of this research.

1.4. Proposed Outcomes

This paper explores the concept of an activity-based parks typology. It focuses on the space implications of an activity-based parks typology and explores the size requirements for four specific outdoor activities based on available academic and industry guidelines, standards, and/or best practices. Since many of these activities may be influenced by regional and local regulations (e.g. state departments of transportation, municipal codes and regulations), when applicable, local guidelines, standards, and/or best practices are also reviewed. Findings derived from this research are then tested within an urbanizing Community Improvement District (CID) within the City of Atlanta. The findings from this test are then used to explore the planning and design implications of this approach and concludes by suggesting specific recommendations to City of Atlanta planning and zoning regulations to facilitate their implementation.

2. Activity-Based Parks Typology

Expanding on the work completed by the planning and design consulting firm Glatting Jackson Kercher Angling, Inc., the recently completed District of Columbia Parks and Recreation Master Plan completed by AECOM, further explores the concept of an activity-based typology. It states that "an activity-based typology is based on the concept of a 'toolbox' of park spaces to meet various basic recreational and social activity needs, based on context" (AECOM, 2015). The Miami-Dade County Parks and Recreation Master Plan identified these basic outdoor and indoor activities as social and recreational activities that "residents participate in on a daily or weekly basis" (Glatting Jackson Kercher Anglin, Inc. , 2006). The District of Columbia Parks and Recreation Master Plan specifically identified these as the following activities:

Outdoor Activities

- Walk/run/jog
- Walk/curb a dog (On-leash)
- Ride a bike
- Sit outside: read, people-watch, eat lunch, talk with friends
- Picnic
- Tend a community garden
- Bird watch
- Interact/play with others in a playground
- Interact/play with others around table games
- Let your dog run without a leash
- Play a game of catch, Frisbee, sun bathe
- Play "Pick-Up Field Sports" or practice
- Play "Pick-Up Court Sports" or practice
- Attend a local arts fair, festival, green market, or other special event
- Play organized competition sports including games and tournaments
- Swim recreationally in an outdoor pool
- Swim competitively in an outdoor pool
- Play with water sprays

- Fish from land
- Paddle a canoe/kayak/paddle board
- Go boating/sailing
- Participate in an environmental leisure hiking activity
- Participate in adventure sports

Indoor Activities

- Walk
- Run/Jog/Exercise
- Play organized competition sports including games and tournaments
- Attend classes/lectures/social functions
- Swim recreationally in a pool
- Swim competitively in a pool
- Participate in aquatics program
- Play casual/table games
- Socialize

(AECOM, 2015)

Using an activity-based typology, the appropriate 'response' to provide and deliver an activity is based on the development pattern of the neighborhood or area that has the need. For example, the need to walk/ curb a dog may be satisfied by streets and sidewalks in a developed urban area, while the same need in an in-town neighborhood or suburban neighborhood may be satisfied by the grassy lawns or landscaped areas found in the backyards or front yards and setbacks of many of the land uses in these areas. The need to tend a community garden may be satisfied in landscape strip and tree lawn along roadways while in an in-town neighborhood or suburban area, this need may be addressed in the front yard of a school or other community facility. Once park planners and designers have identified a need for a specific activity, they can respond appropriately based on context and the available opportunities within that context (AECOM, 2015).

This activity-based approach may suggest a less land intensive approach for cities and parks and recreation departments to consider when delivering parks and recreation services to residents. Rather than grouping varying types and numbers of recreation facilities and spaces within a single, cohesive space, as the traditional park system typology proposes, the activity-based typology model looks at separating these facilities and surgically inserting them within the built environment. For example, under the traditional parks typology, a typical neighborhood park is comprised of a series of different recreation facilities and spaces grouped together within a single site. Figure 2.1 below shows an example of a typical neighborhood park. This example includes a playground with a picnic pavilion, a basketball court, and two small multi-purpose open spaces. The park is approximately 2 acres in size. While small, 2 acres of undeveloped/vacant land can be difficult to find and expensive to purchase in developed urban areas.

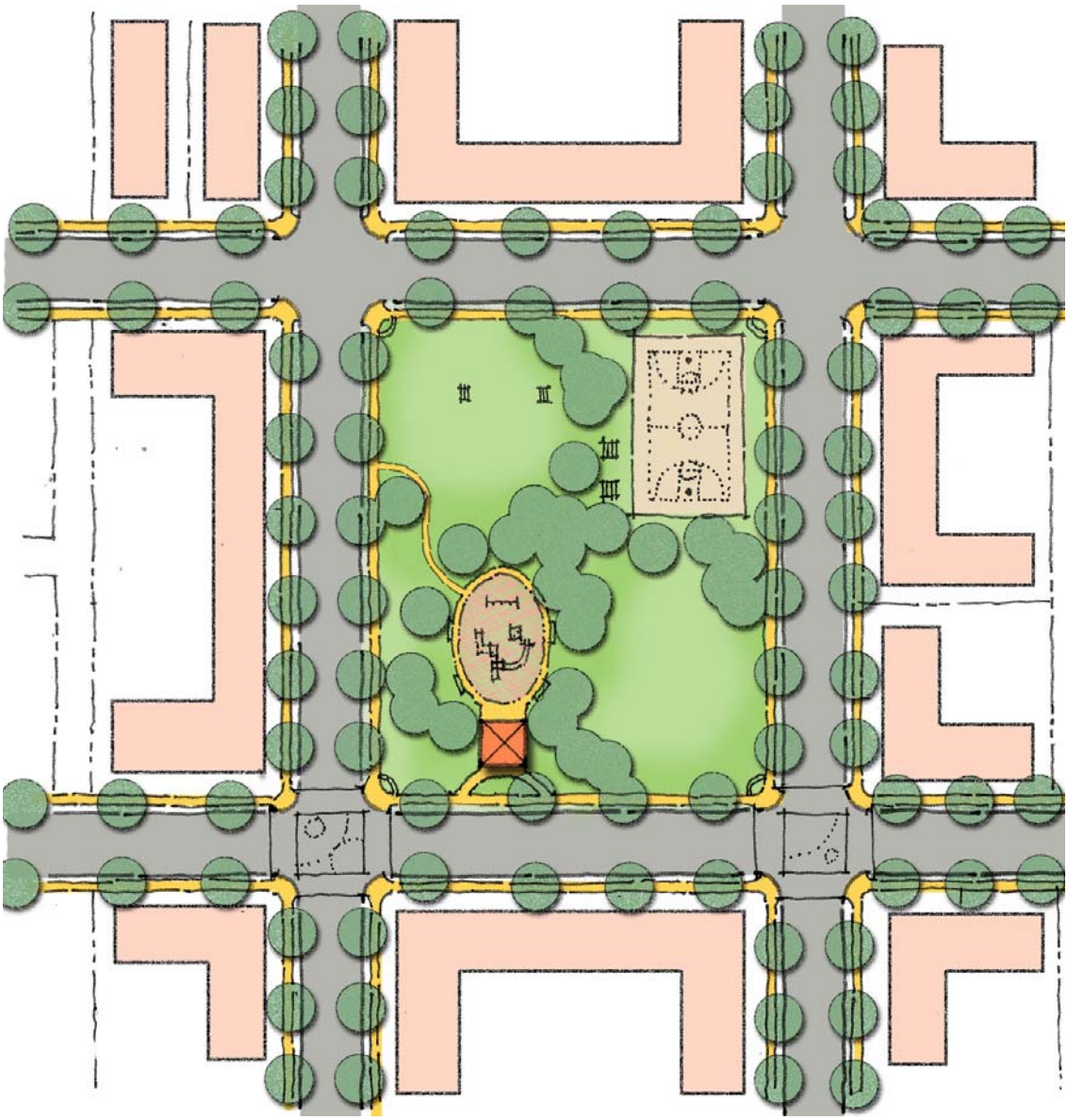


Figure 2.1 – Example of a 2-Acre Neighborhood Park Based on the Traditional Park Typology
Source: Carlos F. Perez

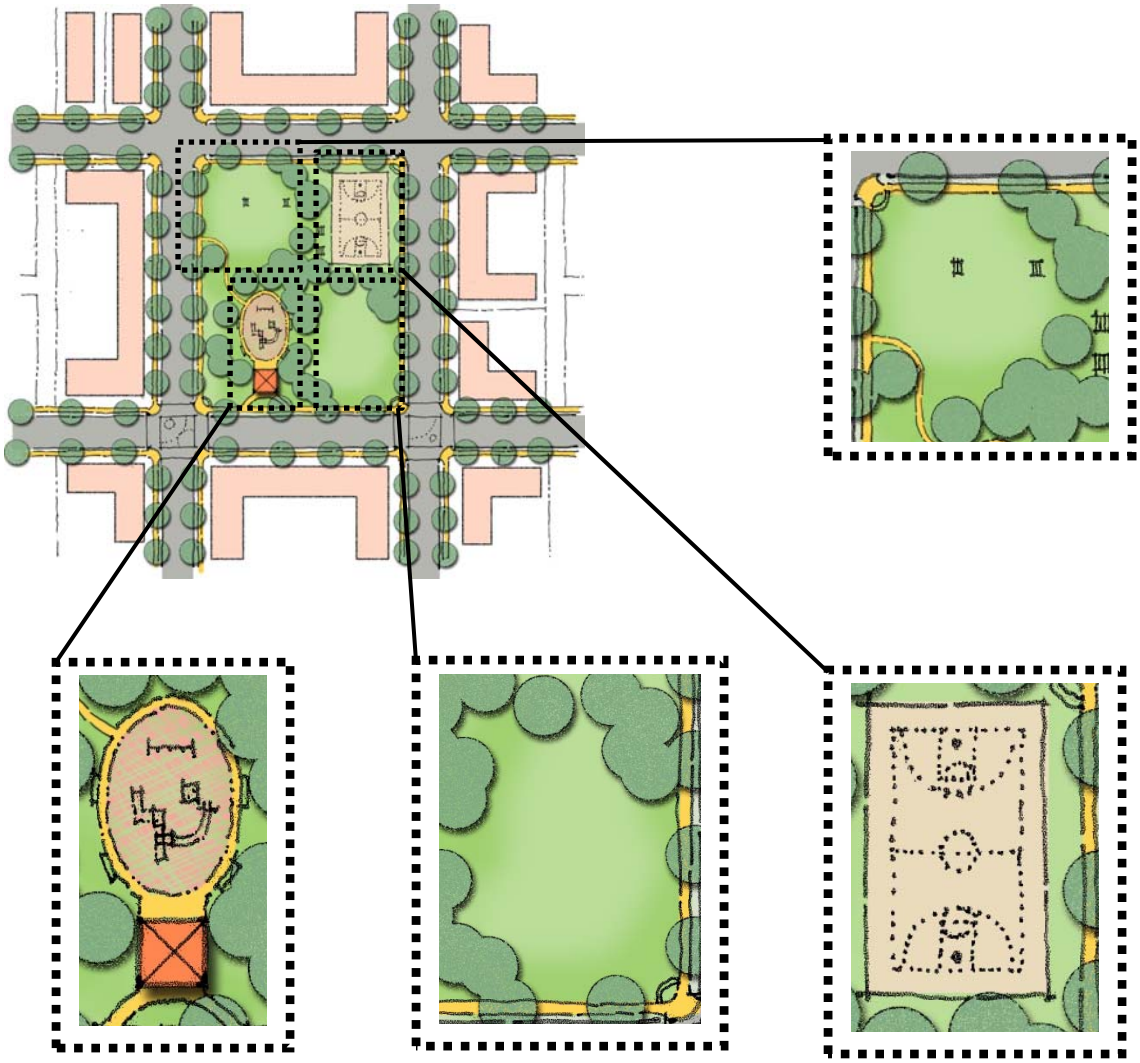


Figure 2.2 – Activity-Based Typology
Source: Carlos F. Perez

The activity-based typology would look at separating these facilities and inserting the individual facilities strategically within the built environmental wherever land might be available. Figure 2.2 above illustrates this concept.

By de-compartmentalizing the traditional neighborhood park into smaller, activity-based pieces as illustrated in Figure 2.2, parks and recreation departments may be better able to respond to the recreational needs and desires of the their constituents in a manner that is less land intensive as compared to the traditional parks system typology. Using the neighborhood park as an example, rather than seeking land that is 2 acres in size, the activity-based typology would help parks and

recreation departments to find land that is smaller in size while still addressing focused parks and recreation priorities and needs in the community.

But what are the spatial requirements of these activities? What other considerations besides space requirements should planners and designer keep in mind when considering these activities? The next section of this paper explores these questions by analyzing the spatial implications and consideration of some of the basic outdoor activities that residents typically enjoy.

3. Spatial Implications of an Activity-Based Typology

3.1. – Basis of Research

The District of Columbia Parks and Recreation Master Plan explored the spatial implications of an activity-based typology of what were identified as the "basic outdoor and indoor activities" that residents typically enjoy. The design guidelines were divided into two sections:

1. Spatial Criteria - Spatial dimensions for the activity.
2. Considerations – Potential contextual issues and suggestions related to the siting of the activity to keep in mind when planning and designing the space for the activity.

The following section analyzes four of the outdoor activities identified in the District of Columbia Parks and Recreation Master Plan and further explores their spatial requirements and considerations. Specifically, it focuses on:

1. Identifying what the key elements of the specific activity are that drive its spatial requirements;
2. Researching and documenting available industry and/or academic standards and guidelines that inform the spatial requirements of the activity;
3. Proposing spatial criteria for the researched activity-based typologies; and
4. Proposing considerations that should be kept in mind when siting the activity based typology.

The specific Outdoor Activities that are explored include the following:

- Walk/run/jog
- Walk/curb a dog (On-leash)
- Let your dog run without a leash
- Play a game of catch, frisbee, sun bathe

3.2. - Walk/run/jog

3.2.1. Spatial criteria

Anecdotally, the elements that appear to drive the spatial requirements and needs for the activity "walk/run/jog" are human dimensions, the safe passage of at least two people

traveling in the same or opposite directions, and the amount of space available for continued forward movement and progress.

Reference data regarding human dimensions suggest that a typical adult male human body is 19.4 inches wide as measured in a standing position. A typical adult female body is 17.7 inches wide (Harris & Dines, 1998). These dimensions however, represent physical standing human dimensions. Physical human dimension in motion can vary based on the moving of the arms and legs as well as adjustments in path of travel. Based on these and other motion factors, a 24 inch width is suggested as a minimum acceptable width for a single pedestrian in motion along a pathway and 48 inches is suggested for two pedestrians (Harris & Dines, 1998).

While sports medicine based spatial criteria recommendations for the activity walk/run/jog were researched, no studies or recommendations were found. Most of the research revolved around walking/running/jogging surfaces and their propensity to cause injuries. One particular study investigated the foot-floor interaction of running on five different surfaces. The five surfaces used in the study included asphalt, concrete, natural grass, and rubber. The study found that natural grass had the least foot-floor impact with concrete and asphalt having the most impact. The rubber surface was surprisingly found to have an impact almost as great as the concrete and asphalt surface. (Tessutti, Ribeiro, Trombini-Souza, & Sacco, 2012). While it is clear that type of surface influences the impact to the body, there is no research that suggests that injury increases due to surfaces. Research competed by James et al found no correlation between running on hard surfaces and increased risk of injury (James & Bates, 1978). Findings from this research suggest that using a hard surface such as a concrete or asphalt for the activity walk/run jog is an appropriate option.

The third aspect that appears to drive the spatial requirements and needs for the activity walk/run/jog is the amount of space available for continued forward progress. While no research was found regarding the length that a typical adult walks or runs for exercise, research was found recommending that amount of exercise that adults should participate in per week to remain healthy. These findings were used to inform what the acceptable amount of space for forward progress may be.

The Centers for Disease Control and Prevention (CDC) recommends that adults should participate in at least 2 hours and 30 minutes of moderate-intensity aerobic activity, 1 hour and 15 minutes of vigorous-intensity aerobic activities, or a an equivalent mix of both each week. Physical aerobic activity that is moderately intense can be achieved by walking briskly while physical aerobic activity that is vigorously intense can be achieved by running or jogging (Center for Disease Control, 2014).

Most people walk at a speed of 2 to 4 miles per hour. 4 to 5 miles per hour is considered a very fast walk or jog and speeds greater than 5 miles per hour are considered jogging or running speeds (James & Bates, 1978). At a brisk speed of 4 miles per hour, 2 hours and 30 minutes of moderate-intensity aerobic activity equates to about 8.25 miles. At a jogging/running speed of 6 miles per hour, 1 hour and 15 minutes of vigorous-intensity aerobic activity equates to about 6.25 miles. Assuming that most adults would exercise three times per week, these findings suggest that a 2-mile to 3-mile walking experience should be available to residents in the community.

Based on the suggestions discussed above, linear spaces and corridors such as sidewalks, multi-purpose paths, and trails can be considered appropriate examples of spaces where people can walk/run/jog. When designing these spaces however, planners and designers have to consider a variety of industry best practices and standards that inform the planning and design of these spaces. These industry best practices and standards may also inform the spatial requirements of the activity walk/run/jog.

The American with Disabilities Act (ADA) for example, suggests that the minimum clear width for a walking surface needs to be 36 inches. Passing spaces should be 60 inches in width (2010 ADA Standards for Acceible Design, 2010). The American Association for State and Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities deal more with bicycle facilities and shared-use paths where bicycles and pedestrian share the same space. This publication suggests a minimum width of 10 feet for a two-way, multi-use path. Typically, widths range from 10 to 14 feet with a 2-foot shy zone on each side of the path. The guidelines also address using sidewalks located adjacent to a

roadway as spaces where bicycles and pedestrian mix. The guidelines refer to this space as a "shared-use path." While this condition is not encouraged, the guidelines suggest that it is allowable for a short distance and should be a minimum width of 11 feet (American Association of State Highway and Transporation Officials, 2012).

While academic, industry, and federal agency best practices and standards exist that may inform the spatial requirements of certain spaces that facilitate the activity walk/run/jog such as sidewalks and paths, many municipalities also have their own standards and guidelines that inform the design of these spaces and that need to be considered. Since this paper seeks to test findings in the built environment located with the City of Atlanta, local agency and government standards and guidelines were also researched.

The Georgia Department of Transportation (GDOT) Pedestrian Guidelines contains various recommendations for sidewalk and trail widths. Central to these recommendations is what the guidelines describe as the provision of a Pedestrian Access Route (PAR). This is defined as "a pedestrian access route that is a continuous corridor of accessible travel, threading its way along sidewalks and across driveways and roadways, free of abrupt changes in level, with a clear width of at least sixty inches and a clear height of at least eighty inches, and assures access for all sidewalk travelers, from those who use wheelchairs or push strollers to those who find their way with a cane" (Otak, Inc. , 2003). Three key points are noted in these recommendations: 1) a continuous corridor free of abrupt changes; 2) clear width of sixty inches; and 3) clear height of at least eighty inches.

The City of Atlanta Municipal Code of Ordnance, which promotes the safety, health, peace, and general welfare of the city and its inhabitants through development codes, states that sidewalks installed in the public-right-of-way are to be a minimum of 60 inches and should conform to the ADA requirements. If there is not sufficient space in the right-of-way to achieve the 60 inches, the code provides the commissioner of public works with discretion as to what the width of the sidewalk should be. The code also states that sidewalks should be designed and installed in such a manner as to protect existing mature trees and facilitate the planting of future trees (City of Atlanta, 2015). This introduces a consideration for the

activity walk/jog/run, the presence of tress. This consideration will be further explored in the next section.

The City' code also provides criteria for the design and implementation of multi-use trails. However, it references the design standards and guidelines established in the most recent version of the American Association of State Highway and Transportation Officials (AASHTO) "Guide for the Development of Bicycle Facilities" referenced previously.

3.2.2. Summary of spatial criteria and findings

Based on the research completed, it appears that an appropriate spatial criteria for the activity walk/jog/run in Atlanta may be a:

> *A continues corridor that has a minimum width of 60 inches and minimum clear height of 80 inches and provides user with 2 to 3 miles of continues travel with minimal interruptions from driveways and roadways. In areas where there is more pedestrian traffic and the potential for mixed pedestrian and bicycle traffic, corridor widths just be a minimum of 11 feet with a 2-foot shy zone on either side.*

3.2.3. Considerations

Considering the appropriate physical dimensions that facilitate the activity walk/run/jog is clearly important. It may also be worth considering elements and dimensions that are more psychological and comfort based and may influence someone's desire to enjoy the activity in one location versus another. In the book "Designing High-density Cities for Social and Environmental Sustainability" (2009), the author, contributing scholars, and experts discuss the factors that influence the desirability and undesirability of living in an urban environment. One of those factors is thermal comfort, narrowly defined "as the absence of discomfort from heat or from cold" (Ng, 2010)**.** A person's thermal comfort – whether they are too hot or too cold – is one of the factors that may influence a person's desire to experience and participate an outdoor activity such as walking/jogging/running. Additionally, it may influence the amount and intensity of the experience. Exposure to the

sun is a key factor in thermal comfort and its desirability may vary depending the time of year. For example in the winter, exposure to the sun may greatly enhance a person's thermal comfort and therefore their desire to participate in an outdoor activity such as walking/jogging/running. During the summer on the other hand, exposure to the sun may be the main source of heat and discomfort and may discourage someone from walking/jogging/running. Therefore, providing exposure to the sun in the winter while providing shade in the summer becomes the challenge when designing for thermal comfort for outdoor activities.

In addressing sun exposure during the summer, research has shown that being under a shade canopy, specifically a tree canopy, has the potential to reduce air temperatures by 3 to 6 degree Fahrenheit in comparison to air temperatures not under a tree canopy (Souch & Souch, 1993)**.** Critical to achieving this effect is developing a healthy and mature tree canopy. A tree's ability to achieve this canopy is largely dependent on available rooting space and soil volumes (Casey Trees, 2008). Research suggests that trees need about 1 to 2 cubic feet of soil volume for every square foot of crown area spread. Achieving a crown spread of minimum 20 feet would require at least 400 cubic feet of soil and could be achieved with a space that is approximately 3 feet deep, 6 feet wide, and 28 feet long (Casey Trees, 2008). These findings suggest that having space for soil that is at least 6 feet wide and 28 feet long adjacent to the linear space or corridor used for the activity walk/jog/run, would allow for the development of a tree canopy that would provide a comfortable micro-climate. A 6-foot wide space with soil and vegetation located between a sidewalk and roadway would also help create separation between moving cars and pedestrians. This separation is appealing to pedestrians as it places pedestrian further away from moving traffic and mitigates any nuisance associated with moving cars. In fact, one particular study found that pedestrians tolerated vehicle speeds that were 3 to 4 mph higher than 25 miles per hour, when a wider planting strip or a wider street was present, as these conditions placed them further away from moving traffic (D. Warren, 2002).

As discussed previously, ensuring exposure to the sun during the winter would enhance a person's thermal comfort and allow them to enjoy walking/jogging/running. The presence of a shade canopy along a linear corridor however, would limit exposure during

the winter. An option to address this is to plant deciduous trees along the linear corridor. Since deciduous trees drop their leaves during the summer months, the space would receive sun exposure.

Another consideration for the activity walk/jog/run is psychological comfort. Specifically related to the preferred distance or spatial bubble that humans unconsciously place between them and another person depending on the type of social interaction. Of interest in this research is understanding the spatial bubble and preferred distance for unobstructed forward vision of someone walking/jogging/running. Cultural Anthropologist Edward T. Hall discusses this concept in his book "The Hidden Dimension" (1966). In his book, Hall identifies four spatial zones with distances that humans exhibited during varying types of social interactions. These are:

- **Intimate Distance** – Distance at which the "presence of the other person is unmistakable and may at times be overwhelming because of the greatly stepped up sensory inputs. " Hall suggest that this occurs at 0-6 inches and a far phase of 6-18 inches and is typically exhibited with people that are most trusted.
- **Personal Distance** – Distance that is characteristic of a "small protective sphere or bubble that an organism maintains between itself and others." Hall suggests that this distance occurs between 1.5 – 4 feet with a close phase stretching to 2.5 and the far phase covering 2.5 – 4 feet. The far phase of this zone is one that people tend use for friends and family and appears to be an acceptable distance for conversations.
- **Social Distance** – Distance that is acceptable for normal interactions in Western culture and is mostly observed in public, business, and social settings, where people may want to remain in contact with others but not be too close to them to intrude on their personal distance. Hall suggests that this distance occurs between 4 – 12 feet with a close phase of 4 – 7 feet and a far phase extending 7 – 12 feet. Beyond this phase, easily communicating with other people becomes difficult and may be exhibited in conversations where people do not know each other well.

- **Public Distance** – Distance that is at the limit of easy communication and where people have to make an effort to communicate. Hall describes this zone as one that has a close phase of 12 – 25 feet and a far phase that extends beyond 25 feet (Hall, 1966).

Hall's findings related to Public Distance, specifically the far phase of 25 and beyond is a distance that appears to be most appropriate for someone that is walking/jogging/running. Both *GDOT's Pedestrian and Streetscape Guide* and *Time Saver Standards for Landscape Architecture* also contain information related to spatial bubbles and preferred distances of desirable unobstructed forward vision for the average pedestrian in specific activities. Both reference publications suggest the following spatial bubbles for the following activities:

- Public event – 6 feet
- Shopping – 9 – 12 feet
- Normal walk – 15 – 18 feet
- Pleasure walk – 35 feet plus

In lieu of no specific spatial bubble provided for jogging/running, the 35-foot plus distance suggested for pleasure walking is the closest to the spatial bubble and preferred distances of desirable unobstructed forward vision for walking/jogging/running.

3.2.4. Summary of Considerations

Based on the research described previously, proposed consideration for the activity walk/jog/run may include:

- *Consider a corridor that provides a comfortable micro-climate through the presence of a minimum 6-foot wide, 28-foot long, and 3-deep (minimum 400 cubic feet) natural area adjacent to the corridor that allows for the mature growth of deciduous trees that provide shade during the summer months and allow sunlight through during the winter months.*

- *Consider a corridor that allows a minimum of 35-feet plus of unobstructed forward vision.*

3.3. Walk/curb a dog (On-leash)

3.3.1. Spatial Criteria

An academic literature search was completed to identify research related to the spatial criteria for walk/curb a dog (on-leash). While no specific research was obtained regarding spatial criteria, much research was found related to increases in physical activity associated with dog walking and the factors that may influence dog owners to walk their dogs. These factors include dog-owner relationships, social environment factors, and physical environmental factors (Westgarth, Christley, & Christian, 2014).

Of interest to this particular research were the physical environmental factors that encouraged dog walking. The presence of dog parks and dog amenities and infrastructure such as clear signage, dog litter bags and bins, accessible water sources, fencing around designated off-leash areas, separation from playgrounds and children's areas, dog exercise equipment, and parks not located near busy roads and well-fenced in were found to positively influence dog walking (Cutt, Giles-Corti, Wood, Knuiman, & Burke, 2008). Additionally a walkable neighborhood environment with grid streets and access to off-leash dog parks versus curvilinear street patterns were found to have a positive influence on dog walking. (McCormack, Rock, Sandalack, & Uribe, 2011). Similarly, lack of access to appropriate walk areas were found to negatively influence dog walking (Rohlf, Toukhsati, Coleman, & Bennett, 2010). While these findings are important for the considerations aspect of the activity walk/curb a dog (on-leash), they did not provide insights into the spatial criteria of the activity besides referencing a "walkable" environment as a critical component of the activity.

Anecdotally, and informed by findings from the literature review, the elements that appear to drive the spatial requirements and needs for the activity "walk/curb a dog (on-leash)" are similar to the activity" walk/jog/run" but with the added factor of a dog.

As discussed previously, based on the dimension of an average adult in motion, a 24 inch width is suggested as a minimum acceptable width for a single pedestrian in motion along a pathway and 48 inches is suggested for two pedestrians (Harris & Dines, 1998). Adding a dog to the activity may change the minimum path width suggested for a single pedestrian in motion.

In order to understand the spatial requirements of a dog, research was completed to understand the various types of dog breeds. Of particular interest were large dogs, as planning for these breeds would ensure that space requirement would function for the remainder of the dog breeds. The largest dog breed was found to be the Irish Wolfhound (Wolfdog, Irish Greyhouhd) which is described as the "largest, tallest, and possibly the most powerful of dogs" (dogsindepth.com, 2015). These dogs range in size between 32 to 35 inches in height and 115 to 180 pounds, with a chest girth of about 42 inches (width 24 inches) and when standing upright on their back legs, Irish Wolfhounds can reach 7.0 feet tall (Irish Wolfhound Club of America, Inc. , 2015). Given these dimensions, it was deemed appropriate by the author that the same amount of space that is suggested for a single pedestrian's travel along a pathway should be allocated for a dog. This suggests a minimum with of 48 inches for activity walk/curb a dog (on-leash). However, this distance does not take into consideration the length of a dog-leash and the roaming space offered to a dog by the leash. In order to understand the potential impacts that leashes may have on the spatial criteria of walking/curbing a dog (on-leash), leashes lengths and functions were explored.

Dog leashes come in different lengths. The appropriate leash length to use while walking a dog is typically informed by the needs of the dog walker. For example, the shortest leashes, referred to as handle leashes, are about 1 foot long and are used by dog owners that need a high degree of control for their dogs (ForDogTrainers.com, 2015). A standard dog leash is 6 feet long and is great for pleasure walks and basic obedience exercises. However, it does not provide the same amount of control that a handle leash provides (RaisingSpot.com, 2015). Retractable leashes extend 25 to 30 feet and are great for leash training a puppy or walking a dog in areas with a lot of field

space. However, they are not as effective at keeping a dog under control (ForDogTrainers.com, 2015).

For the purpose of this study, the standard 6 foot leash will be used to inform the spatial criteria for the activity walk/curb your dog (on-leash). This assumption suggests that the dog's roaming space would extend out 6 feet from the dog walker increasing the space used from the dog walker. This would extend the spatial criteria from 48 inches to 8 feet.

The next factor to consider is the spatial criteria needed to curb a dog or allow a dog to relieve itself. This includes exploring the environmental effects that both feces and urine may have on a given area and the amount of both that may be detrimental to the environment. This is important because in addition to being unsightly and creating undesirable odors, dog waste, particularly fecal matter, may lead to diseases. For example, fecal matter has been found to be a source of pathogens that in some case, have contributed to waterborne disease outbreaks (Ferguson, Husman, Altavilla, Deere, & Ashbolt, 2003; Macpherson, 2005; Hlavsa, et al., 2014). Some communities have even limited the number of dogs permitted in their town to protect water quality. For example, the City of Alta in Utah, with a population of 370 limits the number of dogs to 12 percent of their human population and only provides 42 dog licenses (Foy, 2006).

Urine also has the potential to affect the environment. One study compared dog facilities that concentrate wastes to Concentrated Animal Feeding Operations (CAFOs) that can have negative impacts to the environment if wastes are not managed properly (Wood, Wood, Williams, & Cummins, 2004). Another study suggested that if 100 dogs visited an off-leash dog park each day for a year and excreted even one-quarter of their daily urine within the park, between 34 and 269 kg N and about 15 kg P would be added to the soil annually and have the potential to affect water quality through water runoff or percolation (Petrovic, 1990).

While these findings clearly suggest that pet waste can have negative impacts to the environment and humans, the natural environment is a complex system that also has the potential to curb and reduce the negative impacts of waste such as fecal matter. For example, one study sought to identify the correlation between fecal loading and microbial water quality. The study investigated fecal loading in a popular exercise area adjacent to a creek. Over 100 lbs. of dog feces were accumulated over a 14-month period. The authors hypothesized that based on the amount of dog feces collected and taking into consideration the amount of E. coli burden/g observed in fresh feces, approximate flow rates, and assuming 100% survival and 100% transport into the creek, they would expect a range of 700 – 70,000 colony forming units (CFU) of E. coli per 100 ml of water. The U.S. Environmental Protection Agency (U.S EPA) states that the geometric mean of E. Coli should not exceed 126 CFU per 100 ml. Water samples collected from the study however, were found to be lower than the U.S. EPA geometric mean of E. Coli. The authors believe that the presence of sediment basins and wetlands along the creek have had an impact on the amount of bacteria in the creek (Garfield & Walker, 2008).

Additionally, the authors note that environmental stresses on fecal matter, such as direct sunlight, temperature, and moisture levels may have desiccated the microbes and reduce the E. Coli bacterial numbers before they could even be transported be water in rainfall or snow (Garfield & Walker, 2008). These findings suggest that having areas with ample sunlight can also minimize the impacts of fecal matter on the environment. Furthermore, many times dog owners pick up after their dogs, which limits the immediate impact of fecal matter on the environment. One study found a correlation between the amount of signs reminding users to pick up after their dogs and a lower fecal count (Hart, Bain, & Hart).

Another study sought to determine the levels of nitrogen, phosphate, and pH from urine accumulation within 0-10 cm of soil in two established dog parks in North Dakota; all of which can be detrimental to the environmental if found in concentrated quantities. Both parks received visits of between 20 to 50 small dogs per day. Dog park sizes ranged between 2,606 square feet to 2,896 square feet (Paradeis, et al., 2012).

Overall, maximum phosphate concentrations in the dog parks were well below critical values of 75-200 mg/kg, as established by various states for agricultural runoff management monitoring. Nitrogen levels were found to be within the range of agricultural fields and pH averages were found to be within the optimum range for turf grass (Paradeis, et al., 2012).

The authors cautioned however, that downward movement of the chemicals may impact water quality, specifically if dog parks are constructed over sandy soils and areas of high rainfall. To mitigate these concerns, the authors recommended employing Best Management Practices (BMPs) such as bioretention systems, bioswales, infiltration ponds, rain gardens, vegetative buffer strips and even riparian buffers along the edges of the park as tools to capture any potential nitrogen, phosphate, or sediment in runoff waters. The use of phreatophyte based plant species, or deep-rooted plants that obtain their water from the water table or the layer of soil just above it, that are used for phytoremediation and detoxification were also recommended (Paradeis, et al., 2012).

While these studies did not provide any direct insights into the spatial criteria needed to curb a dog or allow a dog to relieve itself without negatively affecting the natural environment, they did provide some insight into the importance of having systems in place that may assist in keeping areas environmentally clean and healthy. These will be summarized in the next section dealing with considerations for the activity walk/curb a dog (on-leash). In lieu of no specific dimensions available associated with the spatial criteria needed to curb a dog, the author suggests that similar dimensions used for the soil and vegetation areas adjacent to the linear corridor for the activity walk/run/jog be incorporated as part of the spatial criteria of the activity walk/curb a dog (on-leash).

3.3.2. Summary of Spatial Criteria

Based on the research described previously, it appears that an appropriate spatial criteria for the activity walk/curb a dog (on-leash) in Atlanta may be a:

- *A continues corridor that has a minimum width of 8 feet and minimum clear height of 80 inches and provides user with an opportunity for continues travel with minimal interruptions from driveways and roadways and with an adjacent soil and vegetative space of no less than 6 feet wide alongside the corridor for dogs to relieve themselves.*

3.3.3. Considerations

The considerations for the activity walk/run/jog should also be considered for the activity walk/curb a dog (on-leash) since they include pedestrians walking. Specifically, these include having space for soil and vegetation that is at least 6 feet wide and 28 feet long adjacent to the linear space or corridor. This space would allow for planting deciduous trees with a tree canopy that would provide a comfortable micro-climate for the activity walk/jogger/runner.

The next consideration that was included in the activity walk/jog/run was related to psychological comfort. Specifically, it dealt with identifying the preferred distance or spatial bubble that humans unconsciously place between them and another person depending on the type of social interaction. Based on the research conducted, a 35-foot plus distance of unobstructed forward vision was proposed for the activity walk/jogger/runner, which the author believes is also an appropriate distance for the activity walk/curb a dog (on-leash).

Additional considerations for the activity walk/curb a dog (on-leash) may include elements that keep areas environmentally clean and healthy. For example, it was previously noted that in order to minimize the environmental impact of pet waste, certain BMPs should be considered. These included bioretention systems, bioswales, infiltration ponds, rain gardens, vegetative buffer strips with phreatophyte based plant species as tools to capture any potential nitrogen, phosphate, or sediment in runoff waters (Paradeis, et al., 2012).

Furthermore, clear signage encouraging dog owners to pick up after their dogs were found to correlate with a reduced number of fecal counts (Hart, Bain, & Hart). Moreover, certain dog amenities and infrastructure were found to positively induce dog walking such as dog litter bags and bins (Cutt, Giles-Corti, Wood, Knuiman, & Burke, 2008).

3.3.4. Summary of Considerations

Based on the research described previously, proposed consideration for the activity walk/curb a dog (on-leash) may include:

- *Consider a corridor that provides a comfortable micro-climate through the presence of a minimum 6-foot wide, 28-foot long, and 3-deep (minimum 400 cubic feet) natural area adjacent to the corridor that allows for the mature growth of deciduous trees that provide shade during the summer months and allow sunlight through during the winter months.*
- *Consider including bioretention systems, bioswales, infiltration ponds, rain gardens, and vegetation with phreatophyte based plant species within the minimum 6-foot wide natural area adjacent to the corridor.*
- *Consider including clear signage, dog litter bags, and dog waste bins encouraging dog owners to pick-up pet waste.*
- *Consider a corridor that allows a minimum of 35-feet plus of unobstructed forward vision.*

3.4. Let your dog run without a leash

3.4.1. Spatial Criteria

Many cities across the nation have strict laws associated with allowing dogs to run freely without a leash. For example, the City of Atlanta Laws for Paws states that "All dogs must be on a leash when in City of Atlanta parks, trails and public spaces that are not designated dog parks" (City of Atlanta, 2015). Residents caught with dogs not leashed are fined. The only areas where the City of Atlanta allows dogs to run freely

without a leash are in designated dog parks. This appears to be consistent with most urban cities across the country and it is no surprise that various studies reviewed reported anywhere from 1,100 (Allen, 2007) to 2,200 dog parks in the United States (Urbanik & Morgan, 2013). But how big should these dog parks be?

An academic literature search was completed to identify research related to the spatial criteria for an off-leash dog park to facilitate the activity "let your dog run without a leash." While no specific academic research was found regarding spatial criteria, research was found that evaluated existing dog parks for various characteristics. One particular study compared four off-leash dog parks in Texas and in Florida for use patterns, user activities, user satisfaction, and user perception. The four parks analyzed ranged in size from 1 acre to 15 acres. The study found that user satisfaction was substantially highest with the largest dog park (Lee, Shepley, & Haung, 2009). This is consistent with another study completed in Davis, California that compared 17 off-leash park. The study also found a correlation between the size of the park and the ranking of park success. All else being equal, the study recommends that municipalities choose the larger of possible locations for a dog park (Hart, Bain, & Hart).

While these studies acknowledged the overall size of the off-leash dog parks as being important for the success of the park, none of them discussed the number of dogs that should be in the park at a given point. This is particular important since one of the studies noted that providing enough space to reduce crowdedness is an important factor to consider when determining how large an off-leash dog park should be (Lee, Shepley, & Haung, 2009)**.** This suggests that dog parks may have a carrying capacity, or a limit to the recommended number of dogs that should be using the space at any given time. Identifying the carrying capacity of an off-leash dog park could be used to size smaller dog parks in urban areas where parcels larger than 1 acre are at a premium; as long as residents limit the number of dogs that are using the space at any given time.

An academic, professional, and governmental literature search was conducted to identify any research or regulations that establish a minimum size and carrying capacity for off-leash dog parks. No academic research was identified, and while not an exhaustive search focused on professional and governmental regulations, eight examples were identified that proposed a minimum size for off-leash dog parks. Three of the eight studies identified dog carrying capacities limiting the number of dogs in the space at any given time.

Arlington County, Virginia's standards for dog exercise areas for example, recommends a carrying capacity of 450 square per dog with a minimum size dog exercise area of 10,000 square feet with no more than 22 dogs allowed in the park at any given point (Arlington County, 1999). Washington, D.C.'s 2007 dog park operating rules also recommends a carrying capacity of 450 square feet per dog with a minimum size dog exercise area of 10,000 square feet and no more than 22 dogs allowed in the park at any given point. When the carrying capacity has been reached, dog owners are required to limit their stay for 30 minutes while others are waiting (District of Colmbia, 2007). Fairfax County, Virginia recommends a carrying capacity of 700 square feet per dog with a minimum size off-leash dog area of 100 feet by 100 feet, which equals 10,000 square feet. At this size and per the County's established carrying capacity, no more than 14 dogs are allowed in the park at any given point. The County's preferred size however, is at least 27,780 square feet or just about ½ an acre (Fairfax County, 2013).

Other reports simply recommended minimum off-leash dog park size but do not include a carrying capacity. The American Kennel Club, for example, recommends that dog parks be a minimum of one acre (American Kennel Cllub, 2008). The City of Portland, Oregon's 1999 Task force on Off-leash Dogs recommended 5,000 square feet as a minimum size (City of Portland Parks & Recreation, 2004). San Francisco has set the minimum size of their off-leash dog areas to 10,000 square feet with preferred size of ¾ of an acre (City of Olympia Parks, Arts and Recreation, 2006). The City of Atlanta also has a minimum size requirement for dog parks, which is 2 acres (City of Atlanta Department of Parks, Recreation and Cultural Affairs).

In the absence of any academic or scientific research associated with the carrying capacity of dogs and the recommended minimum size of an off-leash dog park, the author of this report is limited to establishing a recommended spatial criteria for an off-leash dog park based on comparable recommendations developed by the cities identified in this report. For the purpose of this report, the author proposes to adopt the minimum dog park size criteria of 10,000 square feet that four of the eight municipalities discussed previously recommended; namely Arlington County, VA; Washington, D.C.; Fairfax County, VA; and San Francisco, CA.

Three of the eight municipalities reviewed also identified dog carrying capacities; namely Arlington County, VA; Washington, D.C.; and Fairfax County, VA. Two of those three proposed the same carrying capacity of 450 square feet per dog; specifically Arlington County, VA and Washington, D.C. Adopting this carrying capacity means that in a 10,000 square foot space, no more than 22 dogs would be permitted to be in the space at any given time. In an effort to simplify this numbers to a whole number, the author proposes to reduce the maximum number of dogs allowed in the space at any given time to 20. This in turn increases the carrying capacity of dogs from 450 square feet to 500 square feet, which is also a simple and easy to remember whole number.

3.4.2. Summary of Spatial Criteria

Based on the research described previously, it appears that an appropriate spatial criteria for the activity let your dog run without a leash may be:

- *A minimum 10,000 square foot enclose space with no more than 20 dogs allowed in the space at any given time suggesting a dog carrying capacity of 500 square feet per dog.*

3.4.3. Considerations

The literature review related to off-leashed dog parks revealed various perceived benefits and concerns associated with off-leash dog parks. The perceived benefits cited for dog parks included dog exercise, dog socialization, bonding/sense of community and socialization among dog owners, and the development of sense of community or neighborliness (Gomez, 2013; Allen, 2007; Lee, Shepley, & Haung, 2009). Concerns were safety to humans and other dogs, noise caused by a group of barking dogs, sanitation problems from the build-up of feces, and disturbance of wildlife or native plants (Hart, Bain, & Hart; Allen, 2007). These findings are important to keep in mind when locating and designing an off-leash dog park and form the basis for the considerations associated with the activity let your dog run without a leash.

One particular study identified safety of people and dogs as the primary concern of park managers, elected officials, and some residents when dealing with off-leash dog parks (Hart, Bain, & Hart). However, a study that specifically focused on interdog aggression in off-leash dog parks found that aggression may be relatively rare and probably presents only a limited risk to dogs and their owners. The authors suggest that this may be due to owners who frequent the dog parks being self-selecting, self-monitoring, and self-limiting in regards to dog aggression (Shyan, Fortune, & King, 2003).

Associated with dog safety however, is the concern of mixing large dogs with little dogs. In order to address this, one study recommended creating separate enclosures for small and large dogs with separate entrances. Small dog spaces usually have a 30 lb limit. Additional enclosures for agility/events/training, wet areas, etc. are also recommended and could be used as the main park if repair/ maintenance is needed in the usual enclosure (Allen, 2007). This is consistent with the findings form another study suggesting that dog partitions enabled park administrators to protect bigger dogs from killing smaller dogs as a risk management effort (Gomez, 2013). The City of Atlanta's also recommends that off-leash dog parks be divided into spaces for large and small dogs (City of Atlanta Department of Parks, Recreation and Cultural Affairs).

Noise caused by off-leash dog parks is another concern community officials, park managers, and residents noted. In order to minimize negative impacts of barking dogs on residential areas, one study recommends that dog parks be not established immediately adjacent to residential property lines. If they are established adjacent to residential property lines, plants, fencing, and/or earth berms should be created to buffer sound with high use areas located away from the property line (Hart, Bain, & Hart). This is consistent with another study that noted avoiding locations directly abutting residence as one of seven important off-leash dog park sitting criteria. The other six included: (1) Avoid interference with other established uses or department-sponsored activities; (2) assure availability of close-by parking; (3) avoid locations near children's play areas; (6) site so as to avoid spillover into non-dog areas; and (6) avoid sensitive environmental habitats (Harkin & Bridges, 2006). The City of Atlanta also suggest sitting off-leash dog parks in areas that do not interfere with existing uses in even park aesthetics (City of Atlanta Department of Parks, Recreation and Cultural Affairs). These location criteria can also address concerns associated with disturbance of wildlife and native plants associated with off-leash dog parks.

The last concern noted by community officials, park managers, and resident was sanitation and the build-up of feces. These concerns can be addressed by including clear signage and dog litter bags and bins encouraging dog owners to pick up after their dogs which were found to correlate with a reduced number of fecal counts and improve dog owner experience (Hart, Bain, & Hart; Cutt, Giles-Corti, Wood, Kniuman, & Burke, 2008). Additionally, and as noted in the previous section, employing Best Management Practices (BMPs) such as bioretention systems, bioswales, infiltration ponds, rain gardens, and vegetative buffer strips that use phreatophyte based plant species can help address sanitation concerns and the (Paradeis, et al., 2012).

The perceived benefits cited for dog parks including dog exercise, dog socialization, bonding/sense of community and socialization among dog owners, and the development of sense of community or neighborliness are also important considerations to keep in mind when locating and designing an off-leash dog park.

One particular study noted the importance of locating dog parks within close proximity of residential areas and revealed that more dog owners frequent dog parks when they are located within close proximity of their homes (Lee, Shepley, & Haung, 2009). This is consistent with previous research that found that residents living within 1 mile of a dog park were more likely to use an off-leash dog park (McCormack, Rock, Sandalack, & Uribe, 2011). The use of off-leash dog parks was found to be further enhanced by a well-equipped off-leash dog parks that provided amenities for both dogs and dog owners. These amenities included walking paths, water play areas such as swimming ponds and water fountains, dog exercise equipment, movable tables and chairs, picnic tables, benches, shade structure, shaded and sunny areas, restrooms, drinking fountains, and vending machines (Allen, 2007; Lee, Shepley, & Haung 2009; McCormack, Rock, Sandalack, & Uribe, 2011; Cutt, Giles-Corti, Wood, Kniuman, & Burke, 2008). The City of Atlanta also suggest some of these elements and recommends that off-leash dog parks have access to a water line to provide "doggie" drinking fountains and are planned and design to offer shaded and open areas (City of Atlanta Department of Parks, Recreation and Cultural Affairs).

3.4.4. Summary of Considerations

Based on the research described previously, proposed consideration for the activity let your dog run off-leash may include:

- *Consider developing separate off-leash park for small dogs and large dogs with separate entrances.*
- *Consider locating off-leash dog parks within 1 mile of residents to maximize park use and foster bonding/sense of community and socialization among dog owners, and the development of sense of community or neighborliness.*
- *Consider locating off-leash dog parks in areas that (1) do not directly abut residential properties; (2) interfere with other established uses or parks and recreation department-sponsored activities; (3) assure availability of close-by parking; (4) avoid locations near children's play areas; (5) avoid spillover into non-dog areas; and (7) avoid sensitive environmental habitats.*

- *Consider including clear signage, dog litter bags, and dog waste bins encouraging dog owners to pick-up pet waste.*
- *Consider including bioretention systems, bioswales, infiltration ponds, rain gardens, and vegetation with phreatophyte based plant species along the perimeter of the off-leash dog park.*
- *Consider adding amenities to dog parks that include walking paths, water play areas such as swimming ponds and water fountains, dog exercise equipment, movable tables and chairs, picnic tables, benches, shade structure, restrooms, drinking fountains, and vending machines.*

3.5. Play a Game of Catch, Frisbee, Sun Bathe

3.5.1. Spatial Criteria

Anecdotally, the elements that influence the spatial requirements and needs for the activity "Play a Game of Catch, Frisbee, Sun Bathe" are based on the average distance that an adult can *recreationally* throw a ball. The term recreationally is used because the purpose of the space is for participants to recreationally throw a ball versus competitively throw a ball. The latter may have an implication on the length that a ball or Frisbee is thrown which may be longer and require a larger space versus a ball or Frisbee thrown if in a recreational setting.

There are many variables that influence the average distance a ball or a Frisbee is thrown. Anecdotally, these may include the gender, build, age, and training of the person throwing the ball or Frisbee; the type of ball or Frisbee that is being thrown; the location where the ball or Frisbee is thrown, or even the weather at the time the ball and Frisbee are thrown, just to mention a few. Without controlling for any of these elements, a simple search for any academic research related to the average throwing distance of a ball or Frisbee was conducted. Through this simple search, three studies were identified.

One study analyzed the difference in throwing distances of handball players based on a series of factors. These factors included the players playing positions, the use of a light versus overweight medicinal balls, and whether or not they were facing opposition from an opponent. Figure 3.1 identifies the distances recorded based on all these factors

(Rivilla-Garcia, Martin, I., Valdivieiso, & Molinuelo, 2011). The purposes of this analysis, the average distance of all the balls thrown by the players in various playing positions and under varying amounts of pressure was calculated. The resulting average distance was 62.85 feet (Figure 3.1).

Figure 3.1 Hand Ball Thrown Distances

Test	Lateral Position	Central Position	Pivot Position	Extreme Position	Back Position	Average Distance per Ball Type
Overweight Medicinal ball	34.92 feet	30.91 feet	30.88 feet	28.14 feet	24.61 feet	29.88 feet
Light Medicinal Ball	114.92 feet	120.78 feet	81.02 feet	75.02 feet	75.01 feet	93.35 feet
Average Distance per Position Type	74.92 feet	75.85 feet	55.95 feet	51.58 feet	62.10 feet	61.61 feet
						64.08 feet
					Grand Average	62.85 feet

Source: Rivilla-Garcia, Martin, I., Valdivieiso, & Molinuelo, 2011)*
*Note: Distances in original study were recorded in meters and were converted to feet for the purpose of this study.

Another study completed as a class experiment by engineering students at the Massachusetts Institute of Technology (MIT), identified 50 feet as the manageable throwing distance of a baseball for an average, non-athletic, MIT "arms" (Massachusetts Institute of Technology, 2006).

The third study was related to Frisbees and sought to analyze the physics behind the flight of a Frisbee. Various trials were conducted using different angles of attack and with varying initial Frisbee velocity speeds. The study found that the maximum distance traveled by the Frisbee was 40 m (127.2 feet) (Morrison, 2005).

These distances were then compared to the average size of typical sports fields to see if any corollaries could be found. Softball and baseball league baseline lengths for example, range from 60 feet in softball and little league fields to 90 feet in collegiate and professional fields. The distance across the diamond (from home plate to second base or from first base to third base) range from 80 feet in softball and little league fields to 120 feet in collegiate and professional fields (Harris & Dines, 1998). A football field measures

172 feet x 372 feet and soccer fields range from 165 feet x 300 feet in junior high school soccer to 225 feet x 360 feet in professional soccer (Harris & Dines, 1998).

The similarities between the average distances from the handball study listed in Figure 4.1, the MIT students' average discussed above, and the flying Frisbee distances compared to the baseball diamond dimensions are intriguing as they are all near and around the dimensions of +/- 60 feet and +/- 120 feet . For the purposes of the is paper in lieu of no additional academic or scientific information, the author believes that the dimensions of a space that is 150 feet x 150 feet might be an appropriate space for the activity of play a game of catch, Frisbee, sun bathe. This amount of space would provide a little more buffer around the ball and Frisbee distances discussed above as well as some additional space to provide sun bathers an opportunity to layout on beach towels, which measure 6 feet x 8 feet, around the edges of the space while people are playing catch or Frisbee.

3.5.2. Summary of Spatial Criteria

Based on the research described previously, it appears that an appropriate spatial criteria for the activity play a game of catch, Frisbee, sun bathe may be:

- *A minimum of 22,500 square feet (about 0.50 acres) and measuring 150 feet x 150 feet.*

3.5.3. Considerations

Anecdotally, considerations for the activity play a game of catch, Frisbee, and sun bathe may include field surface and drainage. Reference data suggests that fields should be irrigated turf with a slope of no more than 1 percent. This ensure optimal playing conditions and contributes to the aesthetics of the park and the surroundings areas (Harris & Dines, 1998). This is consistent with the recommendations found in the National Recreation and Parks Association (NRPA) Park, Recreation, Open Space, and Greenway Guidelines (National Recreation and Park Association, 1996).

3.5.4. Summary of Considerations

Based on the industry reference data discussed previously, proposed consideration for the activity play a game of catch, Frisbee, sun bathe may include:

- *Consider a field surface of irrigated turf with a slope of no more than 1 %*

3.6. Summary of Activity-Based Typology Findings

Based on the research discussed above for the four activities researched, below is a matrix that lists each of the activities analyzed, their spatial criteria, and specific considerations.

Activity	Spatial Criteria	Considerations
Walk/Run/Jog	A continues corridor that has a minimum width of 60 inches and minimum clear height of 80 inches and provides user with 2 to 3 miles of continues travel with minimal interruptions from driveways and roadways. In areas where there is more pedestrian traffic and the potential for mixed pedestrian and bicycle traffic, corridor widths just be a minimum of 11 feet with a 2-foot shy zone on either side.	• Consider a corridor that provides a comfortable micro-climate through the presence of a minimum 6-foot wide, 28-foot long, and 3-deep (minimum 400 cubic feet) natural area adjacent to the corridor that allows for the mature growth of deciduous trees that provide shade during the summer months and allow sunlight through during the winter months. • Consider a corridor that allows a minimum of 35-feet plus of unobstructed forward vision.
Walk/Curb a Dog (On-Leash)	A continues corridor that has a minimum width of 8 feet and minimum clear height of 80 inches and provides user with an opportunity for continues travel with minimal interruptions from driveways and roadways and with an adjacent soil and vegetative space of no less than 6 feet wide alongside the corridor for	• *Consider developing separate off-leash park for small dogs and large dogs with separate entrances.* • *Consider locating off-leash dog parks within 1 mile of residents to maximize park use and foster bonding/sense of community and socialization among dog owners, and the development of sense of community or neighborliness.* • *Consider locating off-leash dog parks in*

	dogs to relieve themselves.	*areas that (1) do not directly abut residential properties; (2) interfere with other established uses or parks and recreation department-sponsored activities; (3) assure availability of close-by parking; (4) avoid locations near children's play areas; (5) avoid spillover into non-dog areas; and (7) avoid sensitive environmental habitats.* • *Consider including clear signage, dog litter bags, and dog waste bins encouraging dog owners to pick-up pet waste.* • *Consider including bioretention systems, bioswales, infiltration ponds, rain gardens, and vegetation with phreatophyte based plant species along the perimeter of the off-leash dog park.* • *Consider adding amenities to dog parks that include walking paths, water play areas such as swimming ponds and water fountains, dog exercise equipment, movable tables and chairs, picnic tables, benches, shade structure, restrooms, drinking fountains, and vending machines*
Let your Dog Run without a Leash	*A minimum 10,000* square foot enclose space with no more than 20 dogs allowed in the space at any given time suggesting a dog carrying capacity of 500 square feet per dog.	• *Consider developing separate off-leash park for small dogs and large dogs with separate entrances.* • *Consider locating off-leash dog parks within 1 mile of residents to maximize park use and foster bonding/sense of community and socialization among dog owners, and the development of sense of community or neighborliness.* • *Consider locating off-leash dog parks in areas that (1) do not directly abut residential properties; (2) interfere with other established uses or parks and recreation department-sponsored activities; (3) assure availability of close-by parking; (4) avoid locations near children's play areas; (5) avoid spillover into non-dog areas; and (7) avoid sensitive environmental habitats.* • *Consider including clear signage, dog*

		litter bags, and dog waste bins encouraging dog owners to pick-up pet waste. • *Consider including bioretention systems, bioswales, infiltration ponds, rain gardens, and vegetation with phreatophyte based plant species along the perimeter of the off-leash dog park.* *Consider adding amenities to dog parks that include walking paths, water play areas such as swimming ponds and water fountains, dog exercise equipment, movable tables and chairs, picnic tables, benches, shade structure, restrooms, drinking fountains, and vending machines.*
Play a Game of Catch, Frisbee, Sun Bathe	*A* minimum of 22,500 square feet (about 0.50 acres) and measuring 150 feet x 150 feet.	• *Consider a field surface of irrigated turf with a slope of no more than 1 %*

4. Testing the Activity-Based Parks Typology

4.1. Overview

The Activity-Based Parks Typology provides a flexible strategy for cities with urbanizing and limited undeveloped land to respond to the recreation and social needs and desires of residents. It accomplishes this by breaking down the traditional parks system into specific activities and developing spatial requirements and considerations for their implementation. Since these spatial requirements and considerations are a lot less land intensive than the traditional National Recreation and Parks Association (NRPA) park classifications, they can more easily be integrated into the built environment.

The spatial requirements and considerations developed through this research were used to test the Activity-Based Typology in an urban area within the City of Atlanta that is almost built out. The study area chosen was the Buckhead Community Improvement District (BCID). The BCID is located approximately 6.5 miles north of Downtown Atlanta in the commercial center of the Community of Buckhead. While Buckhead is considered one of the premier communities in Atlanta, its residents and visitors have very little access to greenspace; specifically those residing, working, and visiting Council District 7, within in which the BCID is located. This was most apparent when the City of Atlanta completed Project Greenspace – The City of Atlanta's Parks and Recreation Master Plan. During this process, Council District 7 was identified as having the least amount of greenspace out of all the Council Districts. Figure 4.1 below illustrates these findings.

Figure 4.1 – Greenspace per City of Atlanta Council District

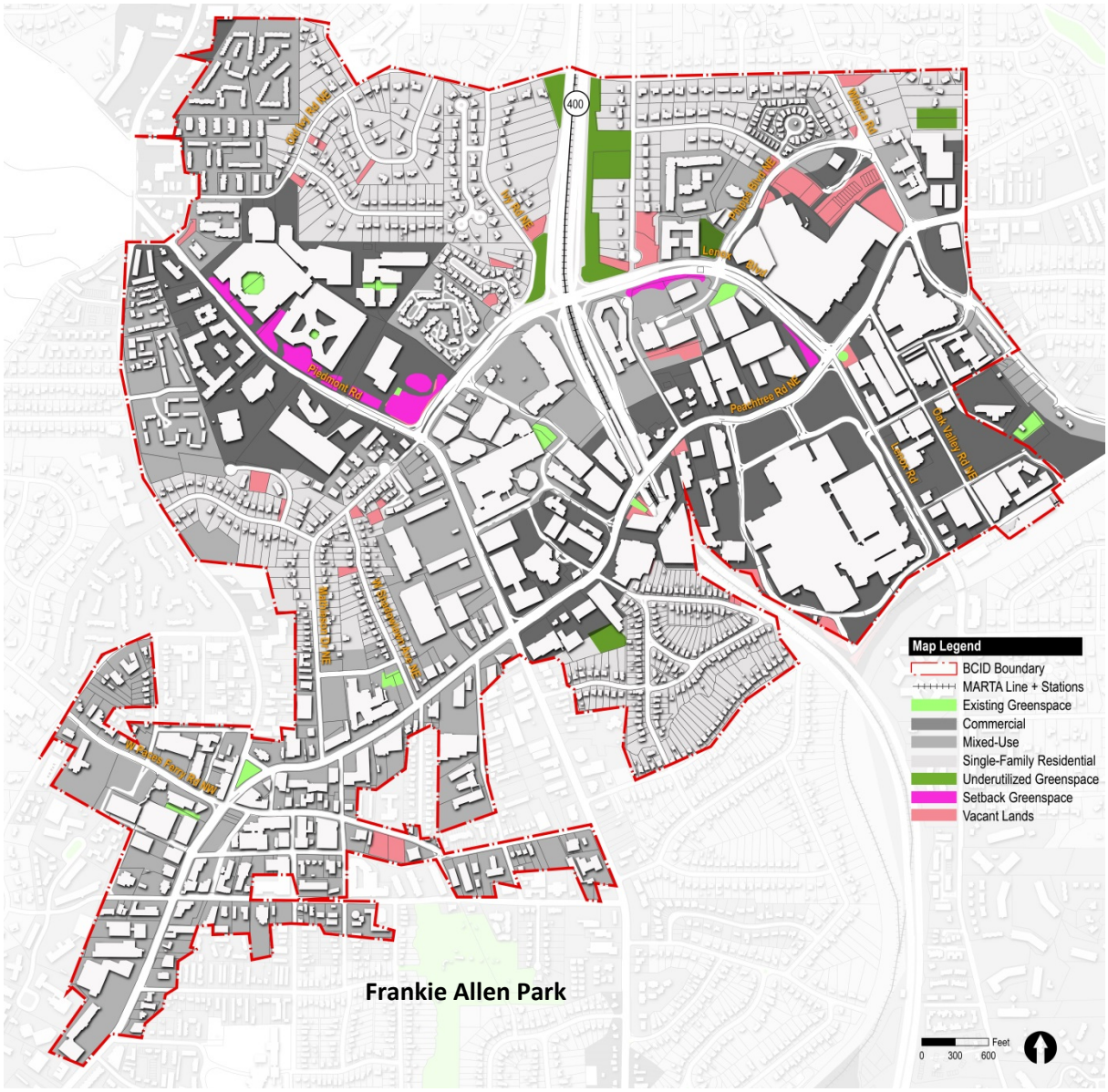
Atlanta Council District	Population (2000)	Total Park Acres	Total Park Acres per 1,000
1	36,165	320.8	8.87
2	36,313	179.3	4.94
3	36,200	194.8	5.38
4	34,573	117.3	3.39
5	32,839	130.1	3.96
6	36,145	367.8	10.18
7	34,419	73.6	2.14
8	35,272	349.0	9.89
9	34,132	253.7	7.43
10	32,967	236.7	7.18
11	34,714	581.1	16.74
12	34,114	616.2	18.06
City-Wide	**417,853**	**3,420.4**	**8.19**

Source: (City of Atlanta, 2009)

As noted in Figure 4.1, Council District 7 had just 2.14 acres per 1,000 population of greenspace. Well below the City's 8.19 acres per 1,000 population, 1.25 acres per 1,000 population lower than Council District 4, the second lowest in the City, and 15.92 acres per 1,000 population lower than Council District 12, the Council District with the largest amount of greenspace.

As mentioned previously, further challenging the BCID is the virtually built-out nature of the area. Figure 4.2 show an image of the of the BCID boundary and illustrates this reality. The image identifies the various types of undeveloped spaces that remain within the BCID. These include existing greenspaces and plazas; underutilized greenspaces; building setback greenspaces; and vacant lands.

Figure 4.2 – BCID Area + Available Greenspace



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

In addition to the built-out nature of the area, the BCID also faces the challenge of high land costs. As stated previously, an acre of land in Buckhead can cost anywhere between $600,000 per acre to about $10 million an acre (Starling, 2010). Purchasing land at these costs for a non-revenue generating purpose such as a park or greenspace is very difficult. As BCID continues to develop and densify, it will become even more difficult to acquire land for greenspace either because the costs will continue to rise or because there simply will not be any more undevelopable land to purchase. The following section discusses the process and analysis used to test the Activity-Based Parks Typology in the Buckhead Area and the findings of the analysis.

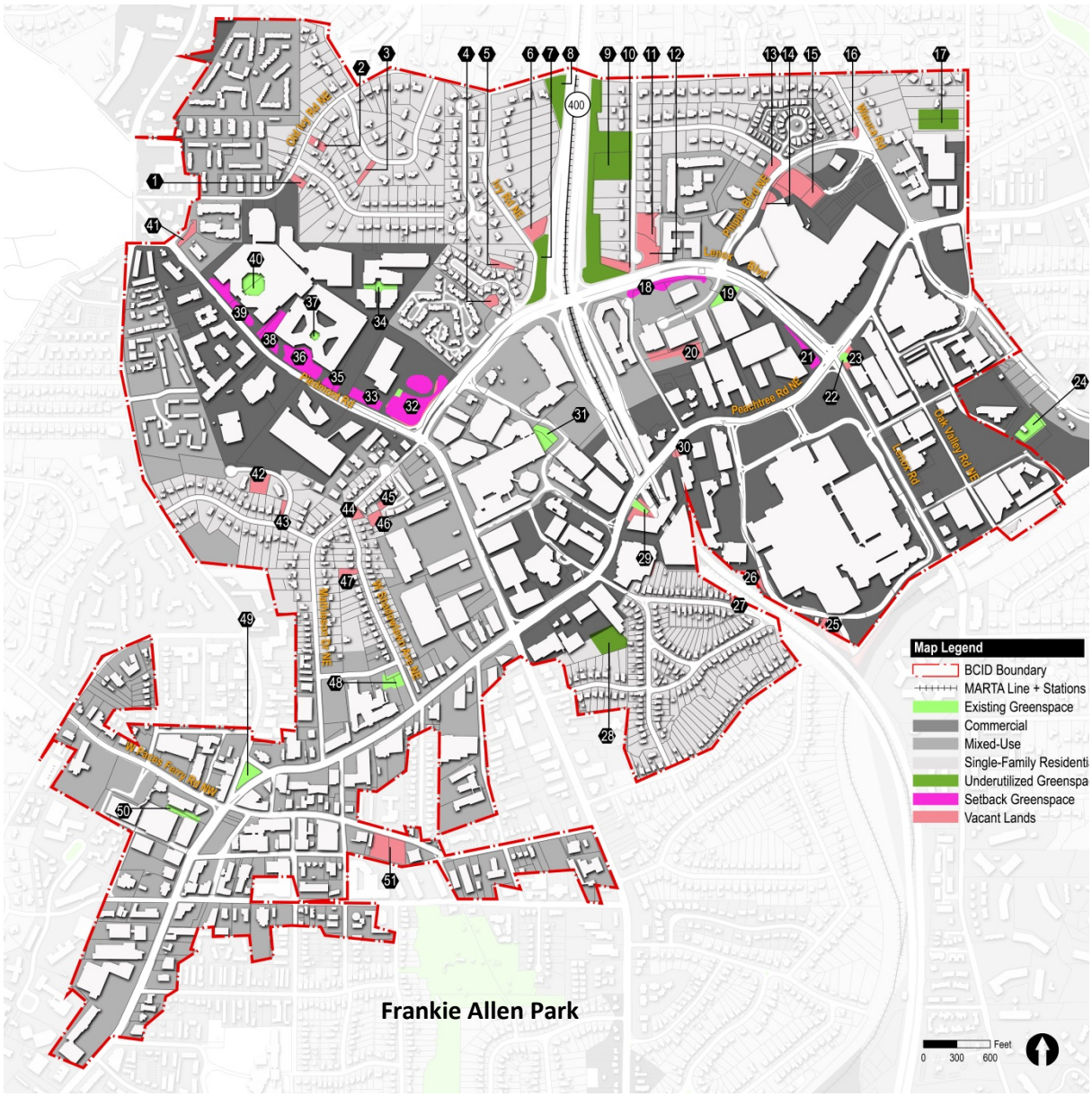
4.2. Process + Analysis

An inventory of undeveloped land within the study area was completed. The sites were identified and measured using Google Earth. As mentioned in the previous section, four types of sites were identified. These included:

- **Existing Greenspaces and Plazas** – Spaces within the study area that are already developed as parks, plazas, and greenspace.
- **Underutilized Greenspaces** – Undeveloped spaces that either are used as water retention areas or are owned by an agency that will require the space to remain as greenspace and currently does not permit public access into the space;
- **Building Setback Greenspaces** – Spaces that are located in front of developed buildings and that were designed to place the building a certain distance from the road and remain as vegetated greenspace.
- **Vacant Lands** – Parcels that remain undeveloped.

Figure 4.3 illustrates these sites and Figure 4.4 lists the type and size of the spaces. Combined, these spaces add up to 1,952,668 square feet (44.82 acres). This is approximately 4.2 % of the 1,006-acre land area. The average size of the identified spaces is 38,288 square feet (0.88 acres).

Figure 4.3 – BCID Area + Inventory of Available Greenspace



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

Figure 4.4 - Inventory + Size of Available Greenspace

Space Number	Type of Space	Size (Square Feet)	Size (Acres)
1	Vacant Land	19,507	0.45
2	Vacant Land	12,618	0.29
3	Vacant Land	11,219	0.26
4	Vacant Land	10,977	0.25
5	Vacant Land	11,071	0.25
6	Vacant Land	72,008	1.65
7	Underutilized Greenspace	25,807	0.59
8	Underutilized Greenspace	50,601	1.16
9	Underutilized Greenspace	313,845	7.20
10	Vacant Land	21,383	0.49
11	Vacant Land	34,631	0.80
12	Vacant Land	46,786	1.07
13	Vacant Land	14,830	0.34
14	Vacant Land	11,874	0.27
15	Vacant Land	65,575	1.51
16	Vacant Land	5,526	0.13
17	Underutilized Greenspace	99,246	2.28
18	Setback Greenspace	71,049	1.63
19	Existing Greenspace	31,080	0.71
20	Vacant Land	33,022	0.76
21	Setback Greenspace	9,600	0.22
22	Existing Greenspace	3,858	0.09
23	Vacant Land	15,303	0.35
24	Existing Greenspace	43,560	1.00
25	Vacant Land	47,797	1.10
26	Vacant Land	35,247	0.81
27	Vacant Land	37,064	0.85
28	Underutilized Greenspace	66,019	1.52
29	Existing Greenspace +Vacant Land	29,522	0.68
30	Vacant Land	8,625	0.20
31	Existing Greenspace	26,349	0.60
32	Setback Greenspace	91,116	2.09
33	Setback Greenspace	32,655	0.75
34	Existing Greenspace	29,771	0.68
35	Vacant Land	17,389	0.40
36	Setback Greenspace	103,353	2.37
37	Existing Greenspace	5,256	0.12
38	Setback Greenspace	44,830	1.03
39	Setback Greenspace	33,327	0.77
40	Existing Greenspace	34,728	0.80
41	Vacant Land	13,853	0.32
42	Vacant Land	29,014	0.67

43	Vacant Land	5,848	0.13
44	Vacant Land	8,727	0.20
45	Vacant Land	13,289	0.31
46	Vacant Land	9,379	0.22
47	Vacant Land	11,883	0.27
48	Existing Greenspace	41,141	0.94
49	Existing Greenspace	25,590	0.59
50	Existing Greenspace	51,784	1.19
51	Vacant Land	64,136	1.47
Total		**1,952,668**	**44.82**

The next step identified the types of activities that the existing spaces are already facilitating. These were identified based on the author's knowledge of the spaces and their use patterns; specifically the activities researched in this report. Below are these activities along with the number or name of the spaces that are currently facilitating these activities.

- Walk/run/jog – #31 + Frankie Allen Park
- Walk/curb a dog (On-leash) - #31 +, Frankie Allen Park
- Let your dog run without a leash – Frankie Allen Park
- Play a game of catch, Frisbee, sun bathe - Frankie Allen Park

It is important to note that while Frankie Allen Park is not located within the study, it may still provide access to activities for residents within the study area to enjoy. This will be further explored in the following step.

The next step analyzed the areas within and adjacent to the study area that currently have "access" to the activities. Whether or not an area has access to the activities is based on their proximity to the space facilitating the expressed activity, and the established Access Level of Services (LOS) for that activity. For example, based on the City of Atlanta's Project Greenspace, a ½ mile Access Level of Service (LOS) is used to determine what areas in the City have access to parks and what areas do not have access to parks. If an area does not have access to a park within ½ mile, then the area is a potential candidate for a future park site to ensure equitable access to parkland throughout the City (City of Atlanta, 2009). Similarly, if a ½ mile is the established Access LOS for the activity "Let your dog run without a Leash", and one of the spaces within the study area is facilitating that activity, then anyone living with a ½ mile of that space has access to that

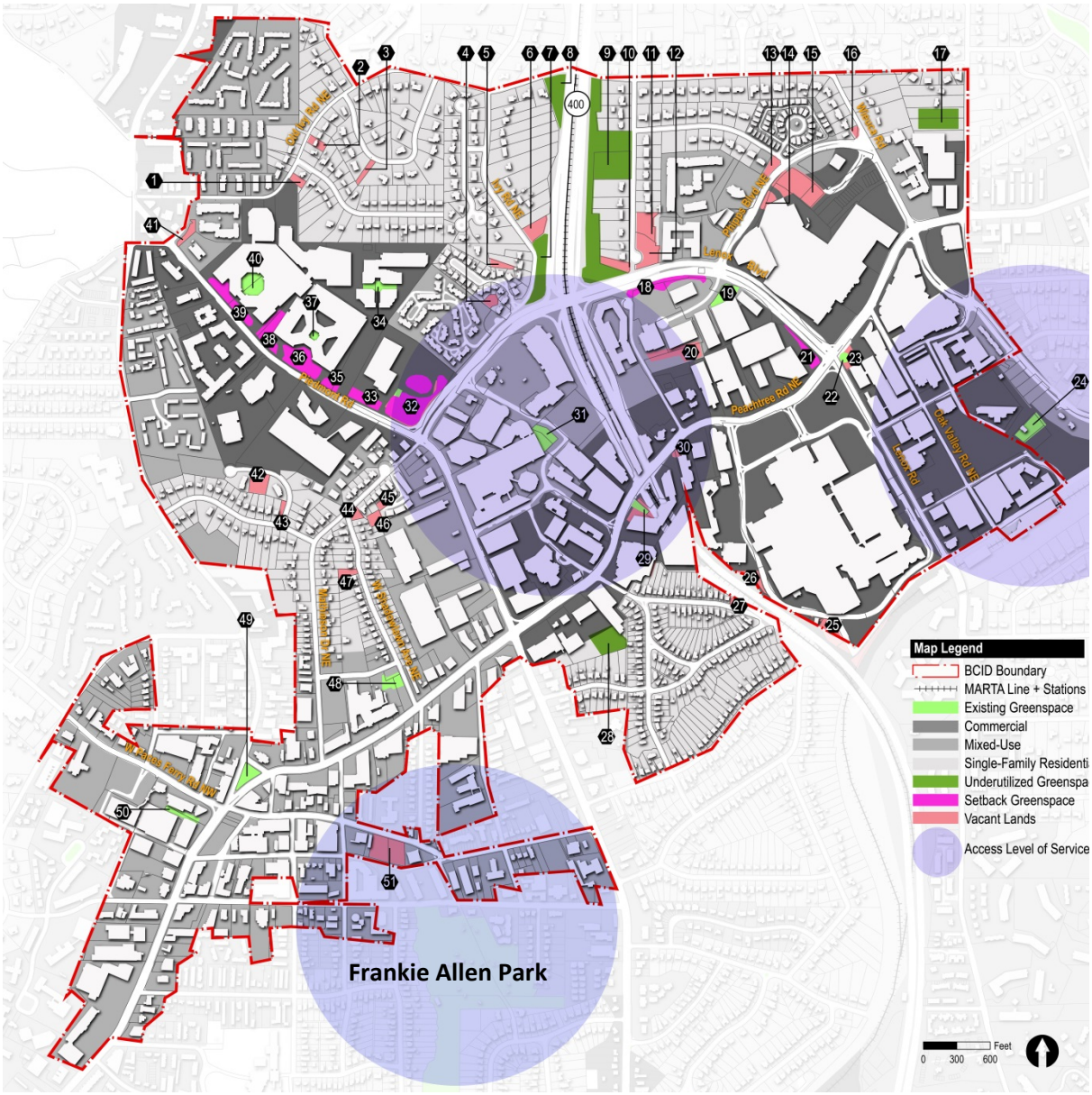
activity. Anyone that does not live within ½ mile, does not have access to that activity and future opportunities to provide them access to that activity should be explored.

Based on the City of Atlanta's Project Greenspace and informed by the research completed for the activities being analyzed, following are the Access LOS distances used for this analysis:

- Walk/run/jog – ½ mile LOS
- Walk/curb a dog (On-leash) – ½ mile LOS
- Let your dog run without a leash – 1 mile LOS
- Play a game of catch, Frisbee, sun bathe – ½ mile LOS

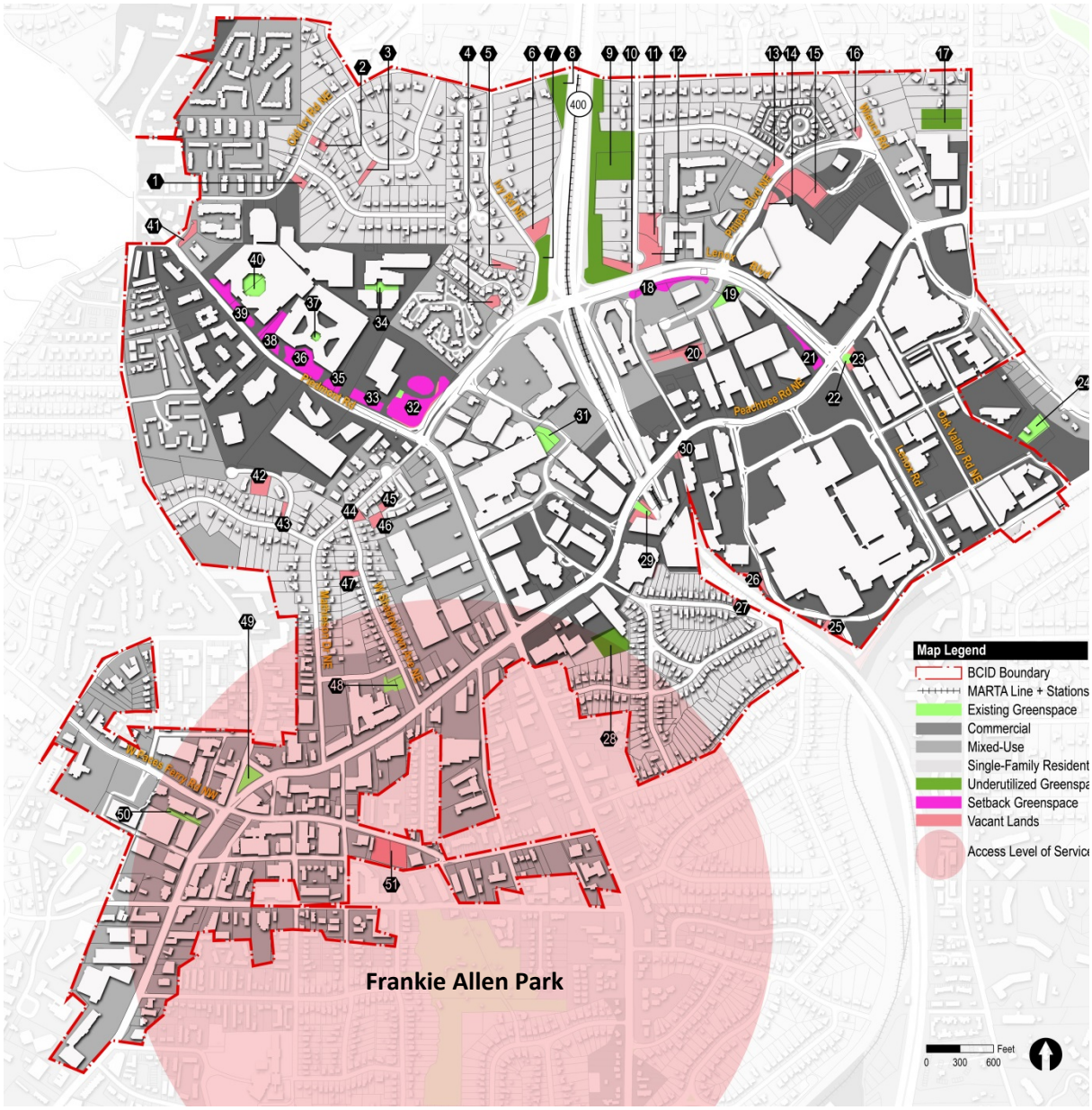
A simple circle with a radius of ½ mile or 1 mile was used to identify the areas that currently have access to these activities. The centers of the circles were placed on the center of the space that currently facilitates the activity. Figure 4.5 show the results from this analysis for the activities Walk/run/jog and Walk/curb a dog. Figure 4.6 shows the results for the activity Let your Dog Run without a leash. Figure 4.7 shows the results for the activity Play a game of catch, Frisbee, sun bathe. As is illustrated in these figures, while Frankie Allen Park is not located in the study area, the circles that indicate the Access LOS for the activities overlap with the portions of the study area enabling residents living within those areas to enjoy the activities .

Figure 4.5 – Access LOS for the activity Walk/run/jog + Walk/curb a dog (On-Leash) based on ½ Mile Access LOS



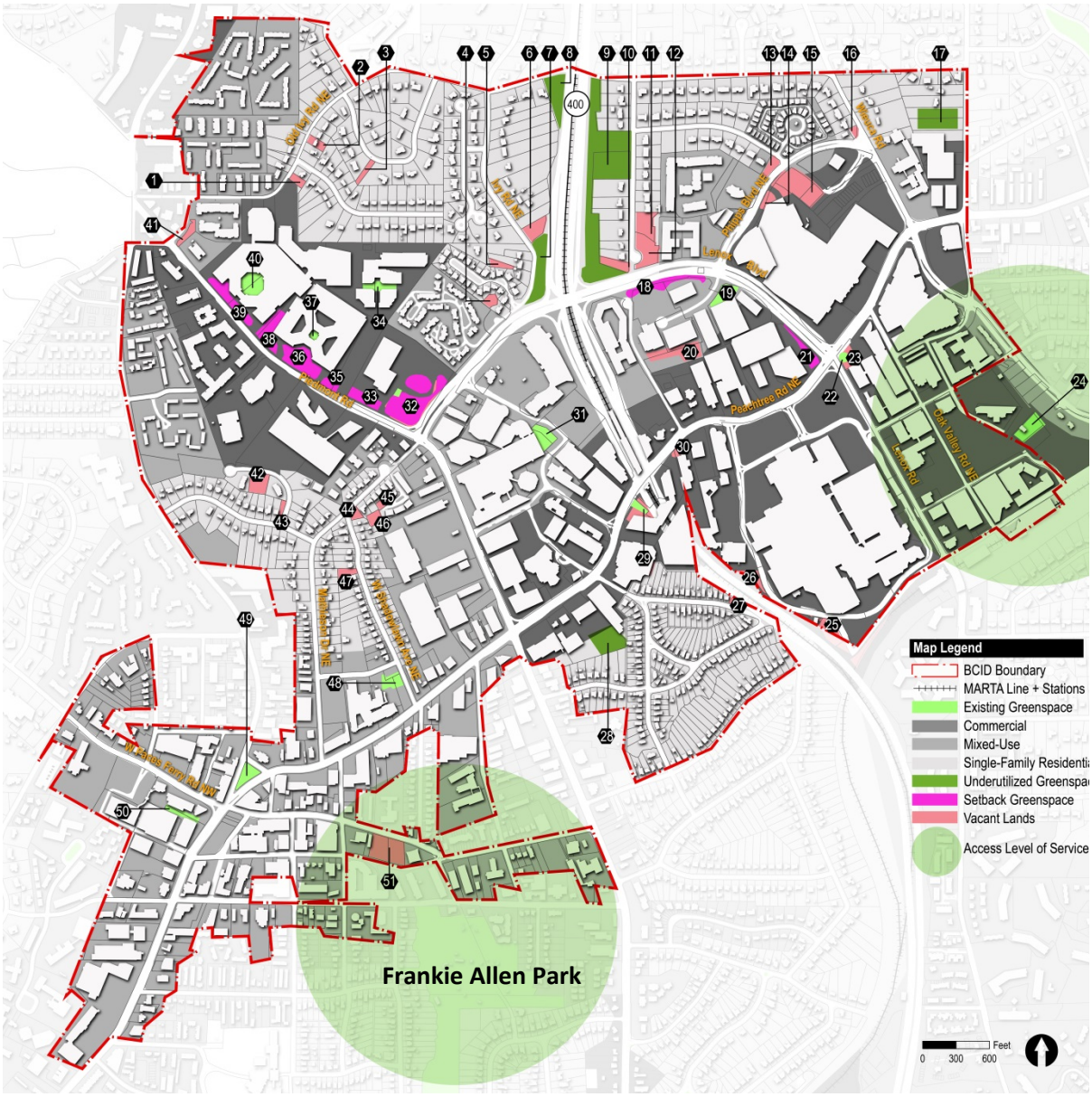
Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

Figure 4.6 – Access LOS for the activity Let your dog run without a leash based 1 Mile Access LOS



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

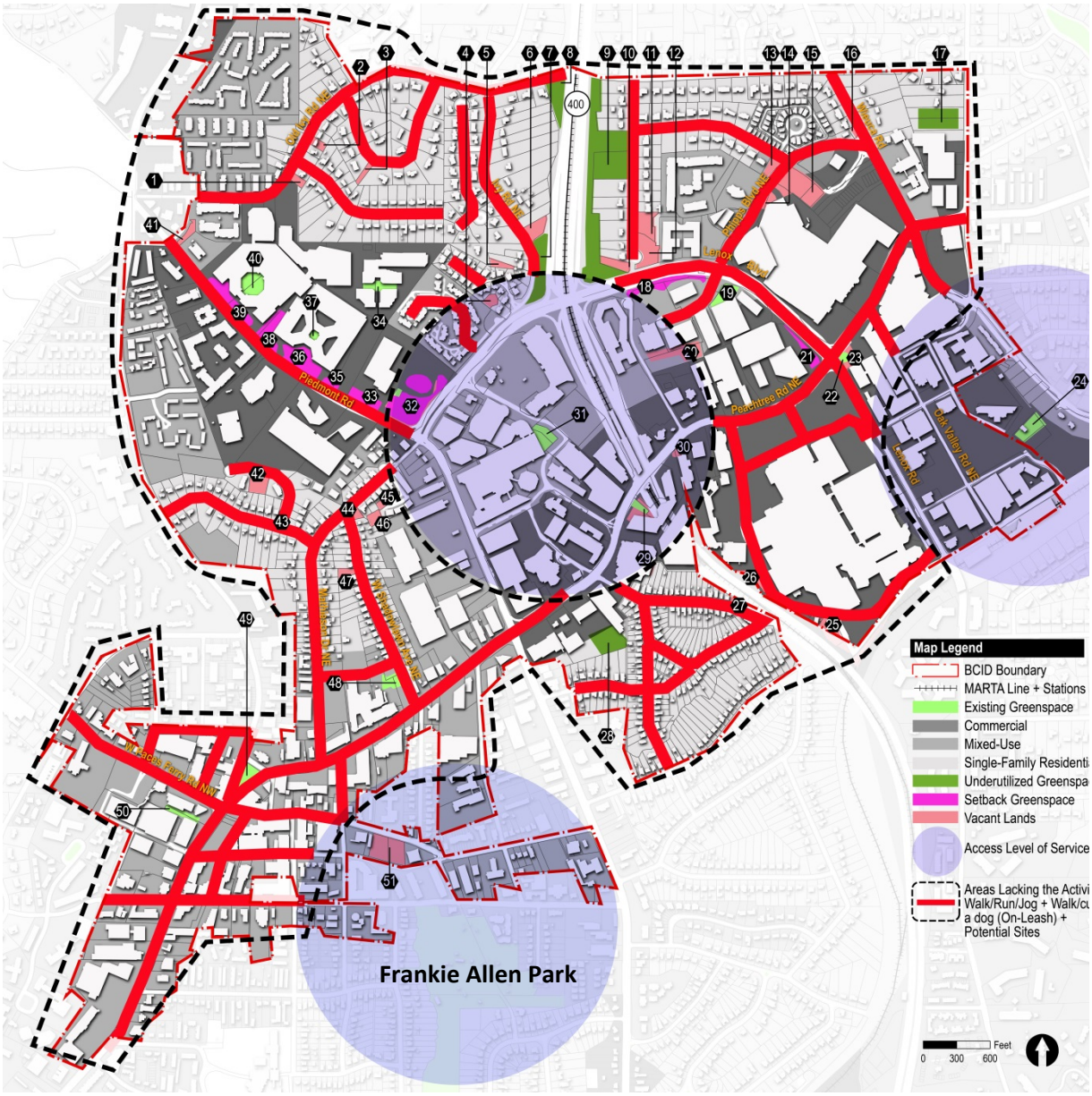
Figure 4.7 – Access LOS for the activity Play a game of catch, Frisbee based on ½ Mile Access LOS



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

As illustrated by this analysis, many areas within the study area lack access to the four activities analyzed. The Activity-Based Parks Typology allows us to fill in those gaps in a strategic and effective manner. Based on this analysis and informed by the spatial criteria of the activities described in previous sections, Figures 4.8 to 4.10 on the following pages identify the spaces that may be able to full the identified activity gaps.

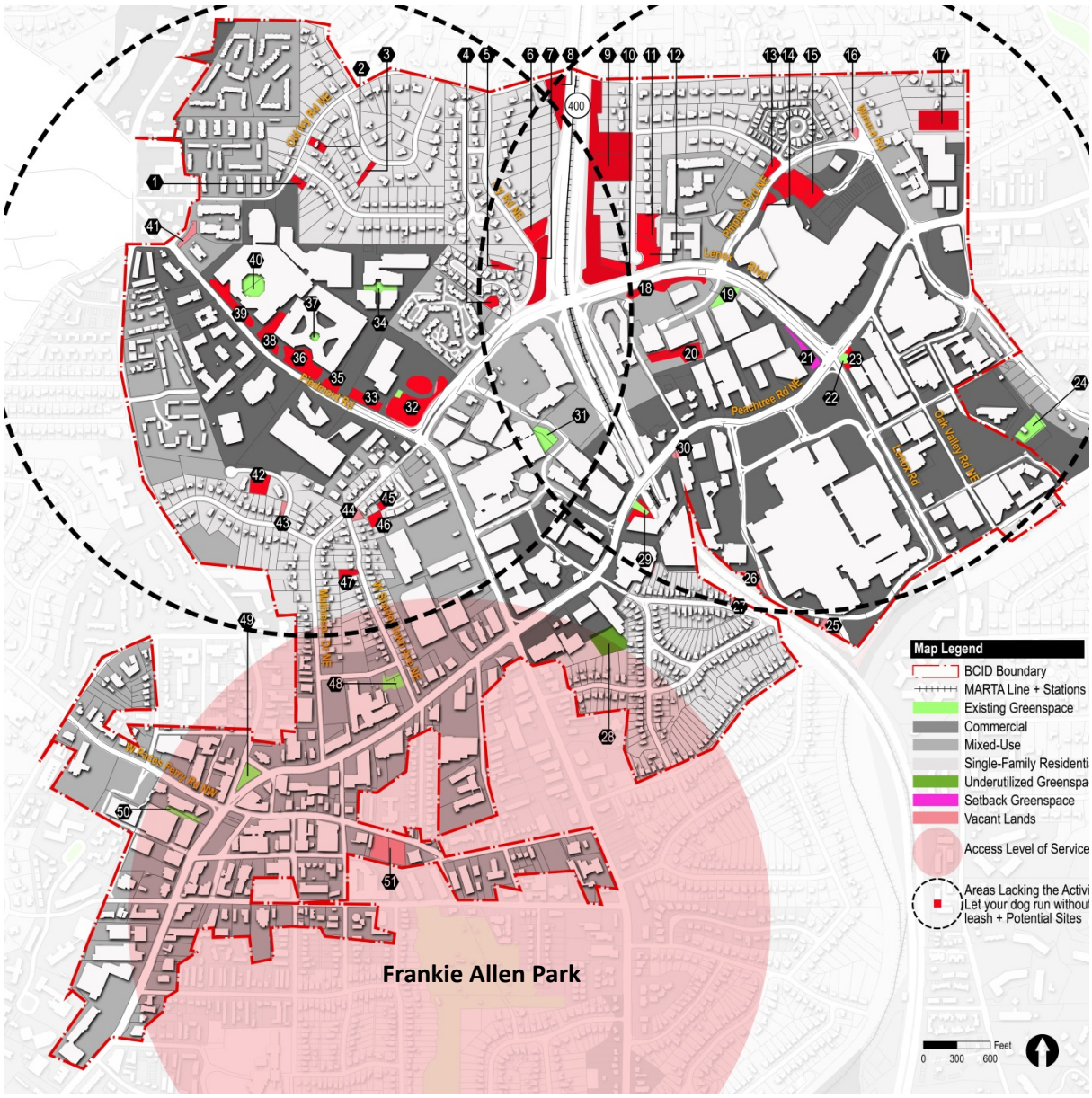
Figure 4.8 – Potential locations to address areas that lack access to the activity Walk/run/jog + Walk/curb a dog (On-Leash) based on ½ Mile Access LOS



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

Figure 4.8 above identifies the sites within the study that may be able to address the activity Walk/run/jog + Walk/Curb a dog (On-Leash). Specifically, these comprise the street network of the study area, which can be modified to match the criteria specified in the Activity-Based Park Typology.

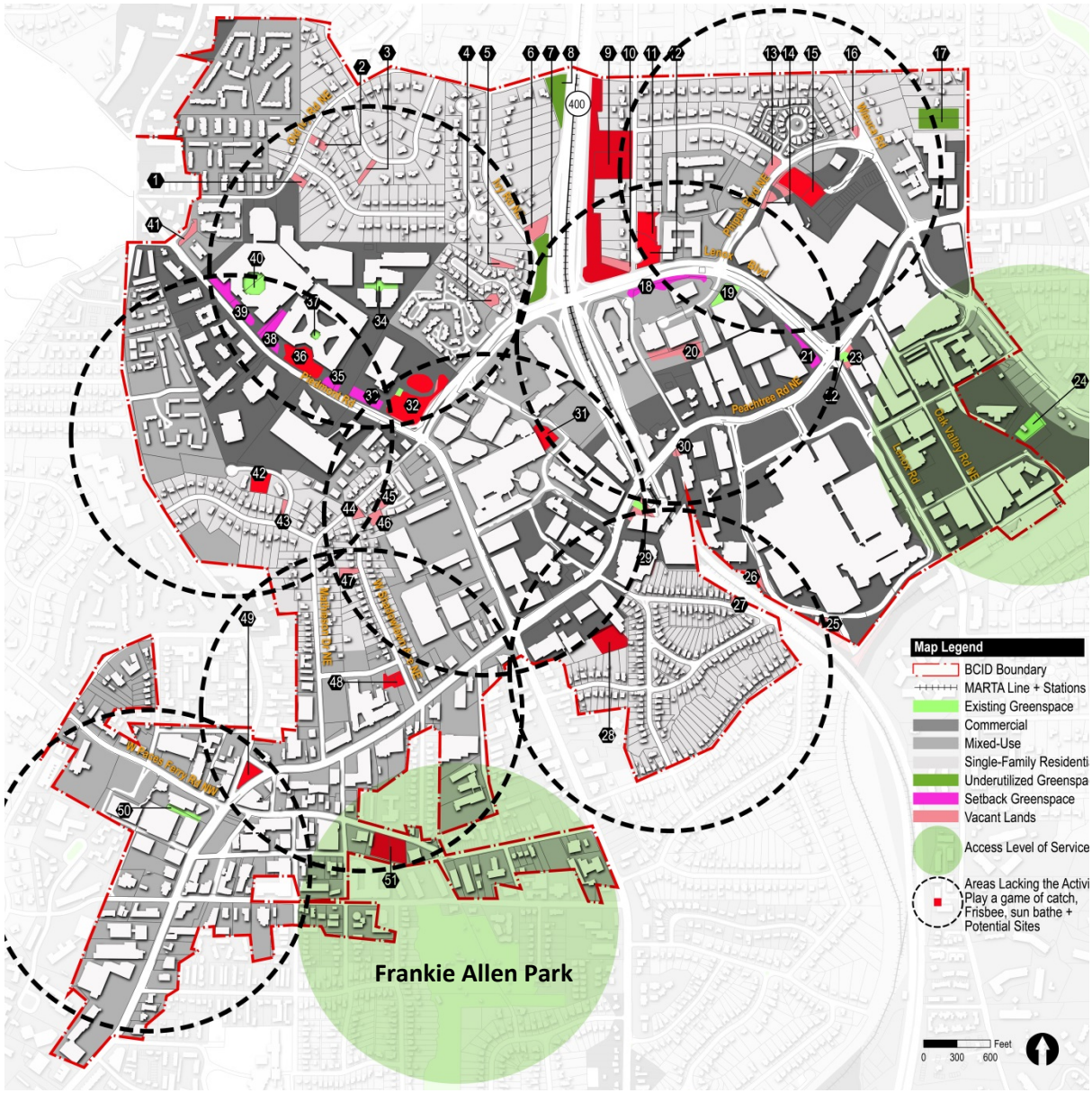
Figure 4.9 – Potential sites to address areas that lack access to the activity Let your dog run without a leash based 1 Mile Access LOS



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

Figure 4.9 above identifies the sites within the study that may be able to address the activity Let your dog urn without a leash. Specifically, these are sites that are 10,000 square feet and over.

Figure 4.10 – Potential sites to address areas that lack access to the activity Play a game of catch, Frisbee, sun bathe based on ½ Mile Access LOS



Source: Carlos F. Perez using GIS Data provided by the City of Atlanta.

Figure 4.10 above identifies the sites within the study that may be able to address the activity Play a game of catch, Frisbee, sun bathe. Specifically, these are sites that are 22,500 square and larger.

4.3. Analysis Summary + Implications

As demonstrated by the Activity-Based Park Typology analysis described in the previous section, many of the undeveloped sites located within the study area such as the underutilized greenspaces, building setback greenspaces, and vacant lands have the potential to address some the community's social and recreational needs. By using the Activity-Based Parks Typology, the parks and recreation needs of the community can be addressed without having to acquire large tracts of land as suggested by National Recreation and Park Association (NRPA) Park, Recreation, Open Space, and Greenway Guidelines. As in any community planning and design exercise, community input is a critical part of the process. Once the candidate sites are identified, community residents and stakeholders should be involved in identifying which spaces should be used for each type of activity.

Prior to that, however, certain standards for the City of Atlanta's Department of Parks and Recreation should be reviewed and development codes revised to facilitate the implementation of the Activity-Based Parks Typology. The following sections highlight these revisions.

4.3.1. Parks and Recreation Level of Service Criteria Additions

Atlanta's Project Greenspace recommends a series of Level of Services (LOS) Standards to help inform the number of parks and recreation facilities that should be developed throughout the City. The standards provided are strictly population based, meaning they suggest the number of residents that each facility should serve. For example, the LOS standards suggest that one spray pad should be provided for every 10,000 residents; or one playground for every 4,000 residents; one tennis court for every 100,000 residents; 1 off-leash dog park for every 50,000 residents, etc. (City of Atlanta, 2009). This type of LOS is provided for 19 different facilities.

While helpful in determining the number of recreational facilities needed in a given area based on the population, these standards do not ensure equitable geographic distribution of the recreation facilities. For example, based on these population standards, one part of a

neighborhood may have enough tennis courts to meet the established population standards, but they may all be located in one section of the neighborhood forcing residents in another section of the neighborhood to travel a long distance to reach those facilities. While equitable from a numbers standpoint, the tennis courts are not equitable from a geographic standpoint.

To address geographic equity, the City's Department of Parks and Recreation should create Access LOS standards that recommend the distance that residents should travel to reach a particularly facility. Including these standards will further inform where certain activities may be lacking and where they should be provided. Doing this will set the framework for using the Activity-Based Parks Typology.

4.3.2. Walk/jog/run + walk /curb a dog (on-leash) Zoning Revisions

Section 138-17-4 of the City of Atlanta Code of Ordinance provides the following guidance for the design of sidewalks:

> *Sidewalks installed in the public right-of-way shall be a minimum width of 60 inches, shall be located at the edge of the right-of-way and shall conform with all ADA requirements. Sidewalks shall be designed and installed in such a manner as to protect existing mature trees and to allow for the planting of future trees. In the event that topographical or other conditions do not allow for the installation of a 60-inch minimum sidewalk, the commissioner of public works is authorized to exercise his discretion to determine an appropriate resolution* (City of Atlanta, 2015).

Based on the findings for the Activity-Based Parks Typology and to facilitate the activity walk/curb a dog (on-leash), the minimum sidewalk width should be increased to 96 inches. Furthermore, the code should include language the includes the development of a vegetative strip that provides is at least 60 inches wide, 3 feet deep, and affords each tree 400 cubic feet of soil per tree to ensure a robust tree canopy. This will ensure that a comfortable microclimate is developed along all of the City's sidewalks and streets to facilitate both the activity Walk/jog/run and walk /curb a dog (on-leash).

In addition to Section 138-17-4 that provides guidance for sidewalks throughout the City, various neighborhoods in Atlanta have Special Purpose Interest (SPI) Districts that provide additional zoning codes and regulations. These zoning overlays, as they are called, are created to protect an existing or proposed character desired by residents that the City of Atlanta Development Code does not achieve. The Buckhead Community Improvement District is governed by one of these SPIs. The SPI provides additional guidance for sidewalks that states the following:

> *Sec. 16-18L.009. - Sidewalks.*
>
> *Public sidewalks shall be located along all public streets and shall consist of two zones: an amenity zone and a walk zone. Public sidewalks shall have the widths identified in Table 5: SPI-12 Buckhead/Lenox Stations Sidewalk Table and shall meet the following requirements.*
>
> 1. *Amenity zone requirements: The amenity zone shall be located immediately adjacent to the curb. Width shall be measured from back (building side) of curb to the walk zone. Minimum width shall be as specified for the applicable street type in Table 5. This zone is reserved for the placement of street trees and street furniture including utility and light poles, public art, waste receptacles, fire hydrants, traffic signs, traffic control boxes, newspaper boxes, transit shelters and similar elements in a manner that does not obstruct pedestrian access or motorist visibility. Such elements, where installed, shall be of a type specified by the director in accordance with uniform design standards for placement of such objects in the public right-of-way.*
>
> 2. *Walk zone requirements: The walk zone shall be located immediately contiguous to the amenity zone and shall be a continuous hardscape for a minimum width as specified for the applicable street type in Table 5, with a consistent cross-slope not exceeding two percent. No fixed elements, including pole mounted signage, traffic control boxes or other utility structures, shall be placed above ground in the walk zone for a minimum height of eight feet.*
>
> 3. *Paving: All sidewalk paving shall be of a type specified in accordance with uniform design standards for placement of such objects in the public right-of-way. Any*

existing decorative hardscape treatment of sidewalks, including amenity zone and sidewalk walk zone areas, shall be retained as part of any new development or replaced with materials that match in size, shape, and color.

4. *Street tree planting requirements: Street trees are required and shall be planted in the ground within the amenity zone and spaced equidistance and on-center between street lights as specified for the applicable street type in Table 5. All newly planted trees shall be single-stemmed at a minimum of three inches in caliper (measured 36 inches above ground), shall be a minimum of 12 feet in height at the time of planting and shall be limbed up to a minimum height of seven feet. Trees shall be planted with a minimum of 40 square feet of evergreen ground cover such as mondo grass or liriope spicata. All tree plantings, replacement and removal shall be approved by the city arborist.*

Buckhead/Lenox Stations Sidewalk Tables	Amenity Zone Minimum	Walk Zone Minimum
Peachtree Road, width (feet)	5′	15′
Primary and local street, width (feet)	5′	10′
Private streets that function as a public street	Not Required	6′

(City of Atlanta, 2015)

Based on the findings for the Activity-Based Parks Typology and to facilitate the activity walk/jog/run and the activity walk/curb a dog (on-leash), the minimum amenity zone should be increased to 6 feet and include guidance to provide 400 cubic feet of soil per tree to ensure a robust tree canopy. Private streets should also include amenities zones and the walk zone minimum should be increased to 8 feet. Rather than planting evergreen groundcovers such as mondograss or liriope spicata, the code should be revised to include bioretention systems, bioswales, infiltration ponds, rain gardens, and vegetation with phreatophyte based plant species to maintain a healthy environment while facilitating the activity walk/curb a dog (on-leash). Additionally, the code should include language that encourages the placement of clear

signage, dog litter bags, and dog waste bins in pet friendly areas encouraging dog owners to pick-up pet waste.

4.3.3. Let your dog run without a leash Zoning Revisions

The City of Atlanta's guide to developing off-leash dog parks currently limits dog parks to a minimum size of two acres (City of Atlanta Department of Parks, Recreation and Cultural Affairs). Based on the findings for the Activity-Based Parks Typology and to facilitate the activity let your dog run without a leash, the minimum should be reduced to 10,000 square feet and dog carrying capacity of 500 square feet per dog to limit overcrowding in off-leash parks.

4.3.4. Play a game of catch, Frisbee, Sun Bathe Zoning Revisions

No development codes were noted that required revisions to facilitate the activity play a game of catch, Frisbee, sun bathe.

This activity-based approach may suggest a less land intensive approach for cities and parks and recreation departments to consider when delivering parks and recreation services to residents. Rather than grouping varying types and numbers of recreation facilities and spaces within a single, cohesive space, as the traditional park system typology proposes, the activity-based typology model looks at separating these facilities and surgically inserting them within the built environment.

4.4. Conclusion

In conclusion, while park systems across the United States have historically been organized and planned around a typology of parks, a more particle way to deliver parks and recreation services in urban areas may allow cities to sustainably address the social and recreation needs of residents in urban areas. As discussed previously, underlying the traditional parks typology is a land intensive approach to providing parks and recreation services. This approach is based

on grouping varying types and amounts of recreation facilities and spaces within a single space. While this approach may be helpful in planning and expanding parks systems in areas where land is inexpensive and readily available, it is not as useful in urban areas where land is at a premium and typically very costly. As the population in these urban areas continues to grow and densify, it will become even more difficult to expand the areas park system based on this land intensive traditional park typology.

An anecdotal analysis of how residents recreate reveals that residents today may not differentiate between the types of parks that they frequent. Instead, they think in terms of *activities,* which suggest a new *'activity-based'* parks typology as a strategy to deliver parks and recreation services in urban areas. This activity-based approach is a less land intensive approach. Rather than grouping varying types and numbers of recreation facilities and spaces within a single, cohesive space, as the traditional park system typology proposes, the activity-based typology model looks at separating these facilities and surgically inserting them within the built environment.

This research paper analyzed four activities identified by previous research and developed spatial criteria and considerations for their implementation. Based on their spatial criteria, the implementation of these activities was tested in an urban environment with very little undeveloped land available. The test positively confirmed that using the Activity-Based Parks Typology, the four activities analyzed could be implemented within the undeveloped land available in the study area and without having to acquire large tracts of land as suggested by National Recreation and Park Association (NRPA) Park, Recreation, Open Space, and Greenway Guidelines. Additionally, various additions and revisions to City of Atlanta Department of Parks and Recreation standards and development codes were proposed to facilitate the implementation of the Activity-Based Parks Typology.

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